Vol. XVI, No. 10
April, 1960

Eugene B. Power
University Microfilms
313 N. First St.
Ann Arbor, Mich.
-1

INDUSTRIAL QUALITY CONTROL

In This Issue

The Concept of Indifference Quality Level In Designing a Sampling Plan

Quality Control Engineering in Process And Product Control

QUALITY through Scientific Methods

JOURNAL OF THE AMERICAN SOCIETY FOR QUALITY CONTROL

If what you make is round or square or odd shaped

If you make it one at a time or by the millions

If you want to check its OD or its ID or a whole

lot of dimensions at once ...and if you want

the gage to indicate a dimension or flash a light

or ring a bell or

a machine on the basis of tolerances

down to thousandths .001 or millionths .000001

SHEFFIELD can recommend the exact type of

Air, Electric, Electronic, Visual or Limit gages you need...

or a complete automatic gaging or assembly machine or system...

with dimensional quality control based on the

ultimate standard of gagemaking: **INTEGRITY**

The
SHEFFIELD
Corporation *Dayton 1, Ohio Dept. 22*

A subsidiary of The Bendix Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

CARL ZEISS

NEW Vertical Metroscope

(BASED ON ABBE'S COMPARATOR PRINCIPLE)

Made in West Germany

Precision Thickness Meter

A new mechanical-optical measuring instrument in a form best suited to modern technical requirements. Measurements can be made on the external dimensions of parts with parallel surfaces, cylindrical parts, balls or pieces with spherical surfaces, and threads (pitch diameter by the 3-wire method).

Operator is seated, and his hands do not touch the instrument while measuring—thus it is not subjected to body heat which might affect precise measurements.

Raising or lowering of the measuring spindle and adjustment of reading devices is done by motor drives which are actuated by levers on the right-hand side of the base. Spindle has a 4″ glass scale, the image of which is projected into a 1-3/4 x 3-1/4″ window at a magnification of 46x. Easy visibility permits fatigue-free measuring over long periods.

The instrument has a heavy cast base with column for the Abbe measuring unit. Measuring table is 6-11/16 x 5-1/8″ and has two working surfaces. One side is grooved for general measuring while the other side has three ribs for gauge-block measurements. Auxiliary tables may be screwed onto the groove side for measuring balls, sheet metal, foil, turned parts with shoulders, etc., and for thread measurements.

Height of measuring unit is adjustable and while in its upper position affords a total working range of 8″.

Write for booklet

CARL ZEISS, INC.

485 FIFTH AVENUE, NEW YORK 17, N. Y.

COMPLETE SERVICE FACILITIES

Editorial Board

MASON E. WESCOTT, *Chairman*
Rutgers • The State University, New Brunswick, N. J.

ALBERT H. BOWKER
Stanford University
IRVING W. BURR
Purdue University
A. C. COHEN, JR.
University of Georgia
CECIL C. CRAIG
University of Michigan
HAROLD F. DODGE
Rutgers • The State University
A. V. FEIGENBAUM
General Electric Co.
ENOCH B. FERRELL
Bell Telephone Laboratories
FRANK E. GRUBBS
Aberdeen Proving Grounds
DAME S. HAMBY
North Carolina State College
CHARLES R. HICKS
Purdue University
HOWARD L. JONES
University of Chicago
GAYLE W. MCELRATH
University of Minnesota
CARL E. NOBLE
Kimberly-Clark Corp.
MARY N. TORREY
Bell Telephone Laboratories
EDWARD M. SCHROCK
American Radiator and Standard Sanitary Corp.

1959-60 Society Officers

President
C. E. FISHER
Bell Telephone Laboratories
New York, N. Y.

Vice Presidents
L. S. EICHELBERGER
A. O. Smith Corp.
Milwaukee, Wis.
A. V. FEIGENBAUM
General Electric Co.
New York, N. Y.
J. Y. MCCLURE
Convair Div. of
General Dynamics Corp.
Fort Worth, Texas
ELLIS R. OTT
Rutgers • The State University
New Brunswick, N. J.

Executive Secretary
DAVID S. CHAMBERS
University of Tennessee
Knoxville, Tenn.

Treasurer
ALLAN M. HULL
United Air Lines
San Francisco, Calif.

Junior Past President
LEON BASS
General Electric Co.
Cincinnati, Ohio

1959-60 Executive Directors

H. DAVIS BIRCH
General Electric Co.
Cincinnati, Ohio
ALLIN P. DEACON
Deacon & Associates
Brantford, Ont.
GERALD J. LIEBERMAN
Stanford University
Stanford, Calif.
WARREN R. PURCELL
Raytheon Mfg. Co.
Newton, Mass.
A. W. WORTHAM
Texas Instruments, Inc.
Dallas, Texas

Advisory Council

E. U. CONDON, *Chairman*
Department of Physics
Washington University
St. Louis, Missouri
M. HERBERT EISENHART, *Retired*
Bausch & Lomb Optical Co.
Rochester, New York
HERMON F. SAFFORD, *President*
Ohio Rubber Co.
Willoughby, Ohio
WALTER A. SHEWHART, *Retired*
Bell Telephone Laboratories
Murray Hill, New Jersey

Divisions of ASQC

Administrative Applications Division
HARRY G. ROMIG
Hoffman Electronics
Los Angeles, Calif.

Aircraft & Missile Division
WM. A. MACCREHAN, JR.
Bendix Radio Division
Towson, Md.

Automotive Division
OWEN F. KEELER
Chrysler Corp.
Dodge Division
Detroit, Mich.

Chemical Division
V. B. SHELBURNE
The Carborundum Co.
Niagara Falls, N. Y.

Electronics Division
GORDON BECKHART
Radio Corporation of America
Camden, N. J.

Textile Division
R. G. MITCHELL
International Latex Corp.
Dover, Dela.

Industrial Quality Control is published monthly by the American Society for Quality Control, Inc. Entered as second-class matter on Sept. 18, 1950 at the post office at Milwaukee, Wis. and at additional entry offices.

Industrial Quality Control is sent to all members of the Society as one of the privileges of membership. Subscriptions from non-members are not accepted. Subscriptions for members *only* are $3.00 of the annual membership dues. Subscriptions for company, public, and university libraries are: 1 yr.—$9.00; 2 yrs.—$17.00; 3 yrs.—$25.00; 5 yrs.—$40.00. Back issues of Vols. I-X are available at $6.00 per volume including index; Vol. XI, $9.00; XII-XV, $10.00 ea. Individual copies are $1.00 each. Microfilm editions by volume are also available. The cost per volume is: I-VII, $10.00; Vol. VIII, *ff.*, $2.00 ea.

Orders for library subscriptions, back issues, and microfilm editions should be accompanied by remittance made payable to the American Society for Quality Control, Inc. *Orders under $3.00 must be accompanied by remittance.*

Industrial Quality Control is regularly indexed in the *APPLIED SCIENCE & TECHNOLOGY INDEX* published by The H. W. Wilson Company, 930 University Avenue, New York 52, N. Y.

Neither this magazine, nor any portion of it may be copied or otherwise reproduced without written permission of the copyright owner. Requests for copyright release should be addressed to the editor, Mason E. Wescott. The statements and opinions given in the articles and papers in *Industrial Quality Control* are the views of the authors and not necessarily those of the Society.

Notification of address change should be sent to the secretary of your section and to the Executive Secretary's office. Allow approximately seven weeks for the change to become effective.

Executive Secretary and Publications office: Rm. 6127 Plankinton Bldg., 161 West Wisconsin Avenue, Milwaukee 3, Wisconsin. Society's New York Address: Rm. 949B, 463 West St., New York 14, N.Y.

Address all correspondence to American Society for Quality Control, Inc., Rm. 6127 Plankinton Bldg., 161 West Wisconsin Avenue, Milwaukee 3, Wisconsin.

Copyright 1960
American Society for Quality Control, Inc.
Printed in U.S.A. All rights reserved

INDUSTRIAL QUALITY CONTROL

Vol. XVI, No. 10 April, 1960

ARTICLES

6 **The Concept of Indifference Quality Level (IQL) in Designing A Sampling Plan**

LAURENCE W. SPOONER 223:70:000

In considering acceptance sampling plans, the author considers the threefold dilemma which involves producer's risk, consumer's risk, and economical sample size, which is not always mutually compatible. What is a reasonable way to compromise?

11 **Quality Control Engineering in Process and Product Control**

ROBERT SCHIN 100;300:60;70:436

The author considers the job of engineering in-process controls, which he views as comprised of seven facets. He employs as his model the Allentown Works, Western Electric Co., a plant of 3,000 people where tangible dollar savings have exceeded 20 million dollars since 1952.

DEPARTMENTS

14th Annual Convention and Exhibition 19-22

Mid-Pacific Conference 20-21

What's New? 18

List of Short Courses in Quality Control 24

Section Briefs 26

Section Code Number Key 27

Book Reviews 35

ASQC Announces 35

Section Calendar 36

Report of the Nominating Committee 37

Product Education Service 38

Positions Available 38, 40

Clinics, Conferences, and Courses 39

Consulting Services 40

EDITOR:

Mason E. Wescott

The Statistics Center
Rutgers • The State University
New Brunswick, N. J.

DEPARTMENT EDITORS:

W. D. Baten, Book Reviews
P. C. Clifford, T. A. Budne, Problems
Ellis R. Ott, Practical Aids
R. A. Wylie, What's New
J. M. Juran, Management's Corner
M. E. Wescott, Scrap Box
Paul A. Robert, Supervisor's Circle
Thomas M. Kearney, Section Briefs
D. S. Chambers, ASQC News

WEST COAST ADV. REP.

Whaley-Simpson Co.
6608 Selma Ave.
Los Angeles, Calif.
HOllywood 3-7157
700 Montgomery Bldg., Suite 305
San Francisco, Calif.

AMERICAN SOCIETY FOR QUALITY CONTROL, INC.

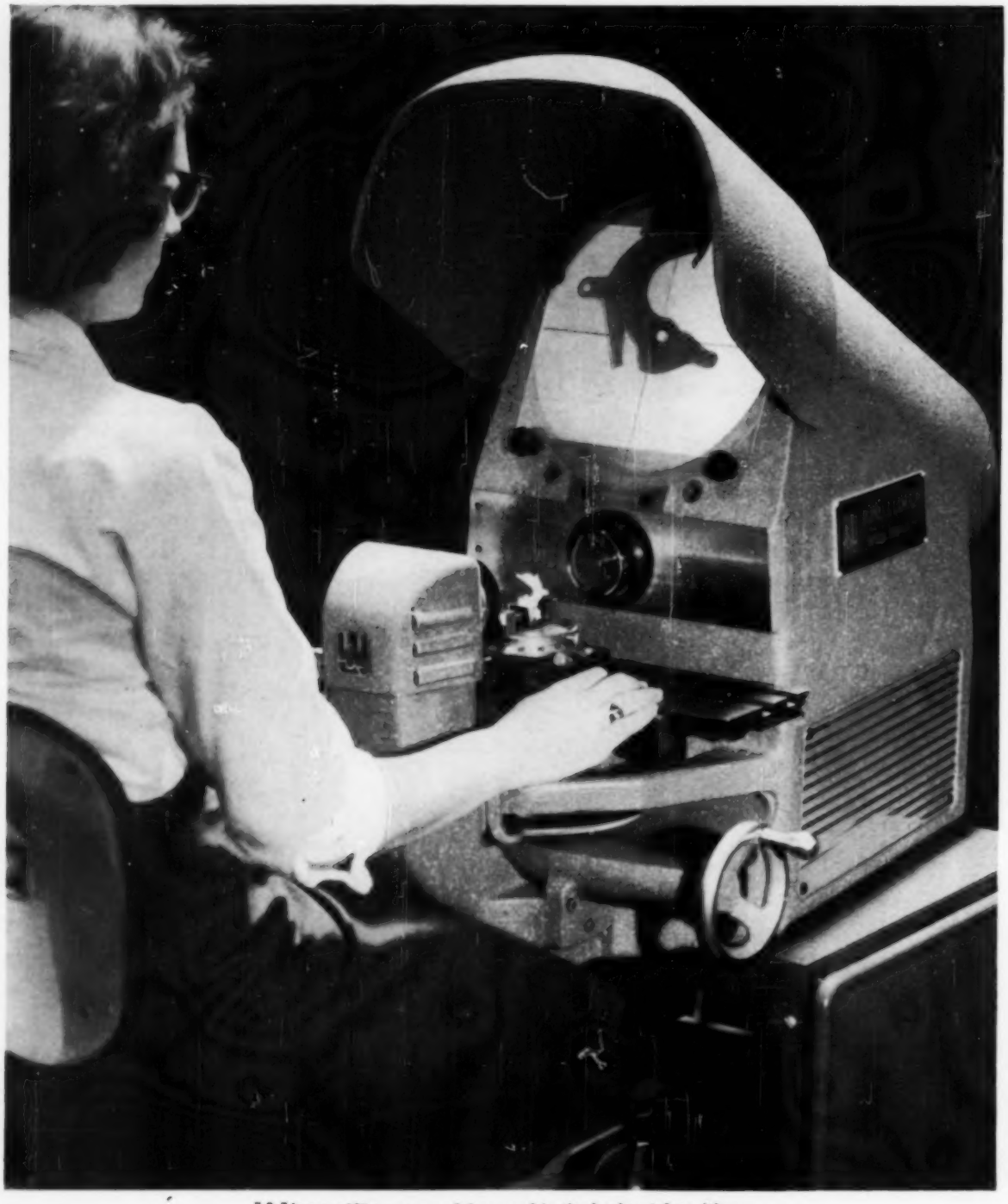
Managing Editor
George R. Foster

Administrative Secretary
William P. Youngclaus, Jr.

Office Manager
Jean Truettner

Room 6197 Plankinton Bldg. **161 West Wisconsin Avenue** **Milwaukee 3, Wisconsin**

NOW...an ECONOMY-SIZE with "Big Machine" Features



J & L's new 10" screen model as used in the horizontal position.

OPTICAL COMPARATOR ...the new J&L TC-10

Now, for the first time, the most important features of "big" optical comparators have been combined in a relatively inexpensive machine, the J&L TC-10. As a result, medium and small producers can greatly improve their quality control procedures.

Three different table styles are available, including a fixed table for straight comparison work, a plain table, and a measuring table which gives 3 inches horizontal measurement and 2 inches vertical. All measurements are read directly to .0001", without computation.

The TC-10 handles big 8 x 10" overlay charts and provides precise comparison inspection for a high percentage of most jobs that are normally handled on larger machines. Eccentric chart holders afford rapid alignment of overlay charts in either the horizontal or vertical position.

Other "big machine" features:

ANGLE MEASURING is accomplished with a chart graduated in 90° segments around the full 360° of its periphery, providing direct measurements to 5 minutes of angle.

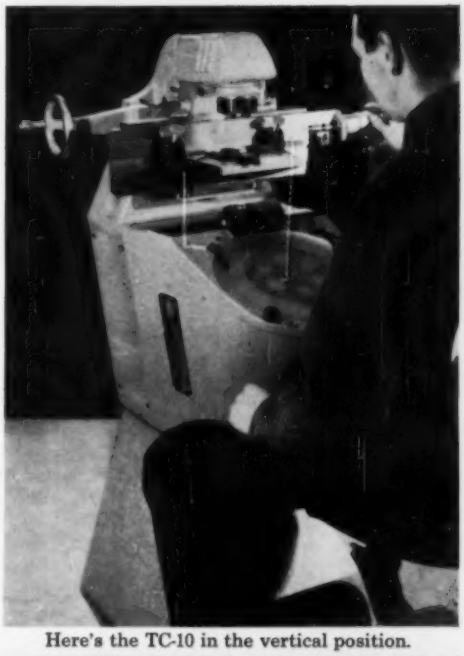
QUICK-CHANGE LENS MOUNT accommodates all lenses from 5X to 125X, with no lens or mirror adjustments necessary. Lenses are matched, pre-set, pre-focused, and coated for extra light transmission.

VERTICAL STAGING is done easily. A custom-designed metal stand rigidly supports the machine in the vertical position. Staging facilities include 2 x 3" coordinate measurements, read directly to .0001", and a plain vertical stage with travel in one direction for straight comparison work.

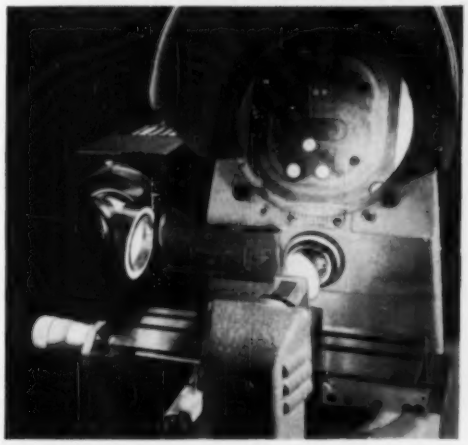
TRACING INSPECTION facilities are readily available. A standard J & L tracing fixture is easily mounted beside the lens.

BONUS! The new 5X, 2" aperture lens, specially designed for the machine, provides comparison inspection capacity and accuracy never before offered on a machine of this size.

See the TC-10 in operation at Booth #1208 ASTE Show, or write for folder #GL-6000.



Here's the TC-10 in the vertical position.



REFLECTION Inspection, too! Among other things, the TC-10 is adaptable for *reflection inspection*. Reflected images are extremely sharp – even at high magnifications.

"the world's oldest and largest maker of optical comparators"

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, 510 Clinton Street, Springfield, Vermont

J&L COMPARATOR DIVISION

The Concept of

INDIFFERENCE QUALITY LEVEL

In Designing a Sampling Plan

IQL

LAURENCE W. SPOONER
Ordnance Department, General Electric Co.
Pittsfield, Mass.

Introduction

The acceptance or rejection of a lot or shipment of material is usually based on the values of certain properties of a sample of several specimens taken at random from the lot. Since it is impractical to inspect or apply measurements to each unit of area in a lot of paper, for instance, and because many of the tests used to evaluate a product of this type are destructive, 100% inspection is not feasible.

ASQC LCS Code 223:70:000

Under these circumstances, it is obvious that the quality of the lot or shipment must be estimated from the quality of the sample. Therefore a suitable acceptance sampling plan must be selected.

Acceptance sampling plans always involve the risk that the sample quality will not truly be the same as the lot quality. Plans vary in their ability

(1) to protect the producer against the rejection of an acceptable product,

(2) to protect the consumer against the acceptance of an unacceptable product, and

(3) to make a sharp decision within economic inspection costs.

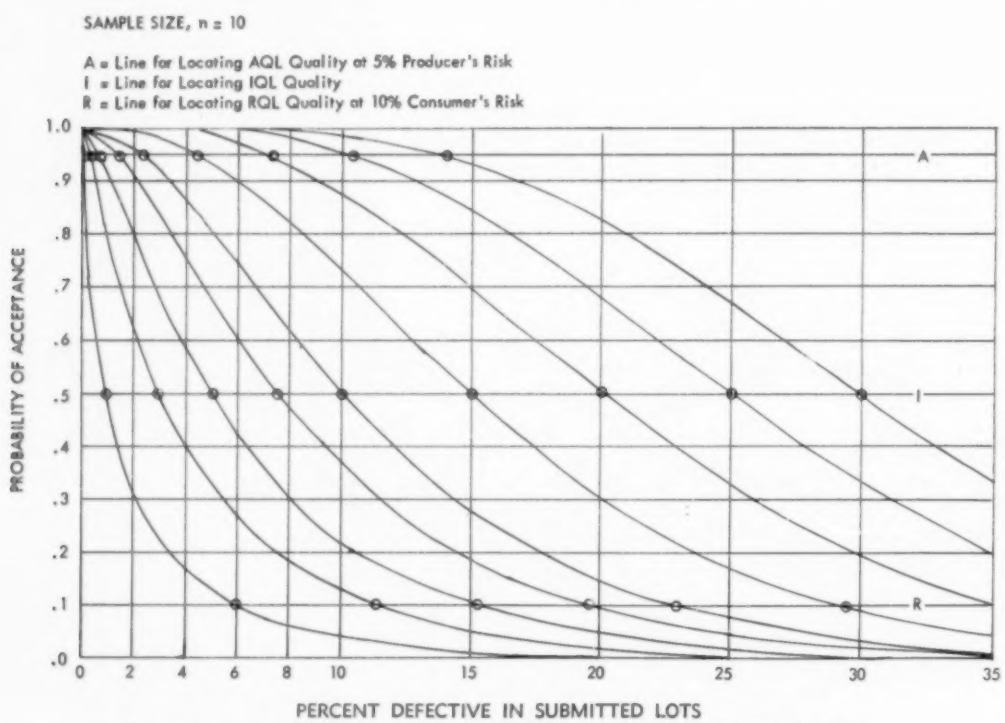


Figure 1—Operating Characteristic Curves—Variables Sampling—One-Sided Protection

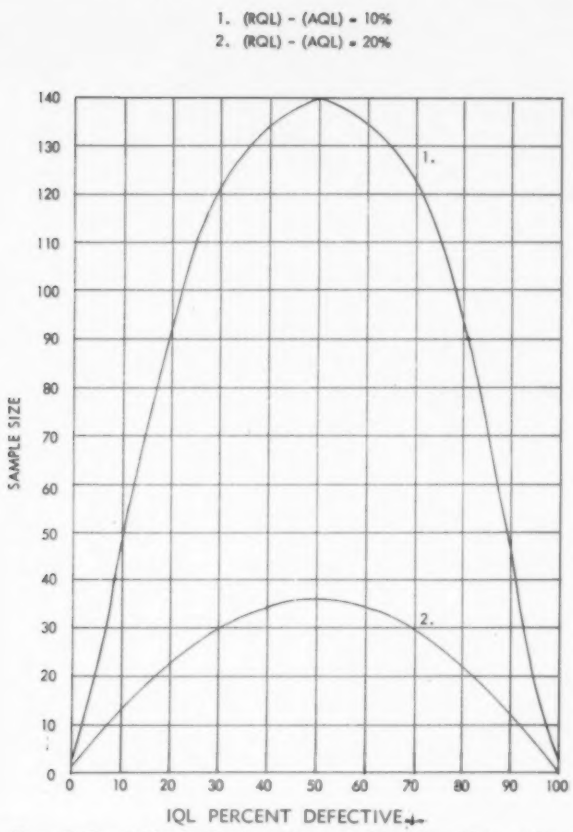


Figure 2 –Sample Size for Constant Sharpness of Decision, (RQL) — (AQL)

Fortunately, however, every acceptance plan has what is known as an operating characteristic (OC) curve which expresses quantitative values of the risks involved. Each acceptance sampling plan states specifically how to treat sample quality determinations in arriving at an acceptance decision. The plan's operating characteristic curve relates true lot quality to the probability of its acceptance by the sample quality.

Although only variables acceptance sampling plans will be discussed here, attribute plans, similar in concept to these plans, can also be derived.

Choice of an Acceptance Sampling Plan

In a sense, there are but two degrees of freedom in the selection of a sampling plan. The plan becomes completely specified if (a) two points on the OC curve, or (b) one point on the OC curve and the sample size, are selected.

The producers interests may be protected by the selection of a suitable AQL (Acceptable Quality Level) for locating one point on the OC curve. Lots with this quality may have, for example, a 95 percent probability of acceptance, which means that they will be accepted by the plan about 95 percent of the time.

The consumer's interests with respect to quality may be protected by the selection of a suitable RQL (Rejectable Quality Level or Lot Tolerance Percent Defective) for locating a second point on the OC curve. Lots with this quality may have, for example, a 10 percent probability of acceptance, which means that they will be accepted by the plan only about 10 percent of the time.

Some plans specify an AQL and a sample size which increases with increasing lot size. These plans seem to overlook the consumer's risk of accepting unacceptable quality, especially in small lots.

Other plans specify both AQL and RQL. These plans face squarely the interests and desires of both producer and consumer, but unfortunately by setting both AQL and RQL the selected plan is fixed and the resultant sample size is all too often uneconomically high.

We have the dilemma, therefore, of having three considerations: (1) producer's risk, (2) consumer's risk, and (3) economical sample size, which are not always mutually compatible. What is a reasonable way to compromise?

IQL, The Point of Control

The statistical "No Man's Land" between AQL and RQL is rather confusing to the average engineer who is called upon to choose or to use one of these plans. Lots poorer than the AQL may often be accepted and lots better than the RQL may often be rejected. Where, if anyplace, is the dividing line between acceptable and unacceptable lot quality? Where is the "Point of Control"? More than anywhere else it is at the IQL — *Indifference Quality Level.*[1,2,3] For sample quality, it is the dividing line between acceptability and unacceptability. On the OC curve, the IQL is the lot quality having a 50 percent probability of acceptance. Lots with higher quality have a higher probability of acceptance than rejection and lots with poorer quality have a higher probability of rejection than acceptance.

The IQL, therefore, gives what seems to be the correct impression as to the intended point of control between the lot quality which we would be content to accept all of the time and the lot quality which we would like to reject all of the time.

When lot acceptance decisions are made from sample quality, they are never 100 percent sharp or accurate decisions. For any given lot, the *sharpness of decision* is a function of the sample size. Therefore, a whole family of acceptance sampling plans can be arranged by selecting (1) an IQL to fix the point of control, and (2) a sample size to establish an economic sharpness of decision. Corresponding operating characteristic curves can be drawn showing the performance of each plan, including the AQL and RQL values where these are of interest.

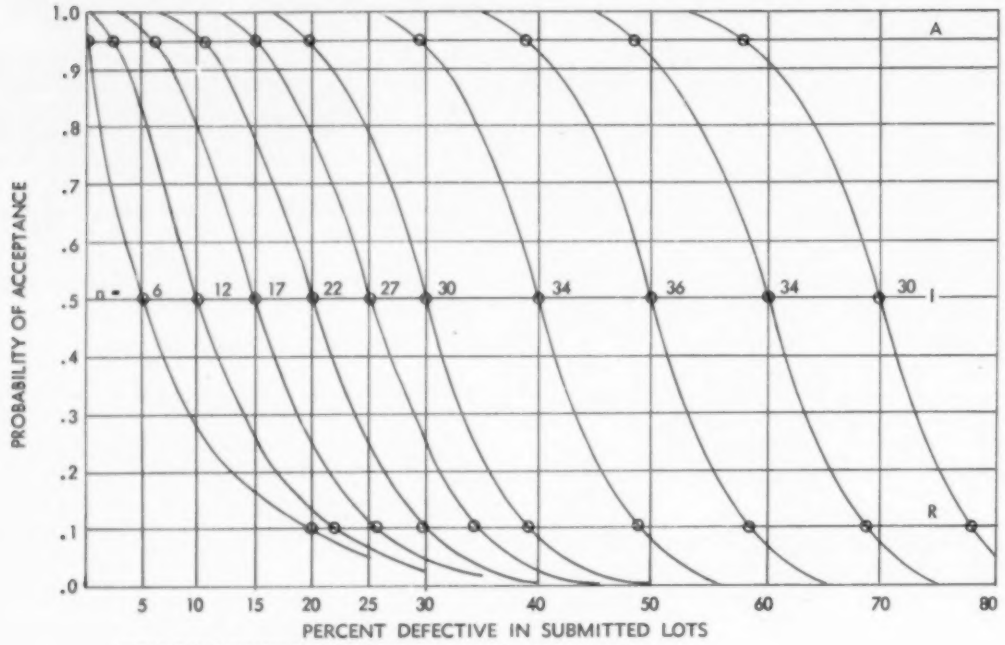
Fixed Sample Size

For any specified control of producer and consumer risks or sharpness of decision, the required sample size is independent of the lot size. Therefore, management can often assign a fixed sample size for its incoming lot inspection plans as a compromise between the desired accuracy of decision and the economics of the testing program.

A fixed sample size is also useful in setting up control charts of the $\bar{X}$ and R type. Control charts

CONSTANT SHARPNESS OF DECISION (RQL) - (AQL) = 20%
NUMBER ON EACH CURVE = SAMPLE SIZE

A = Line for Locating AQL Quality for 5% Producer's Risk
I = Line for Locating IQL Quality
R = Line for Locating RQL Quality for 10% Consumer's Risk



CONSTANT SHARPNESS OF DECISION (RQL) - (AQL) = 10%
NUMBER ON EACH CURVE = SAMPLE SIZE

A = Line for Locating AQL Quality for 5% Producer's Risk
I = Line for Locating IQL Quality
R = Line for Locating RQL Quality for 10% Consumer's Risk

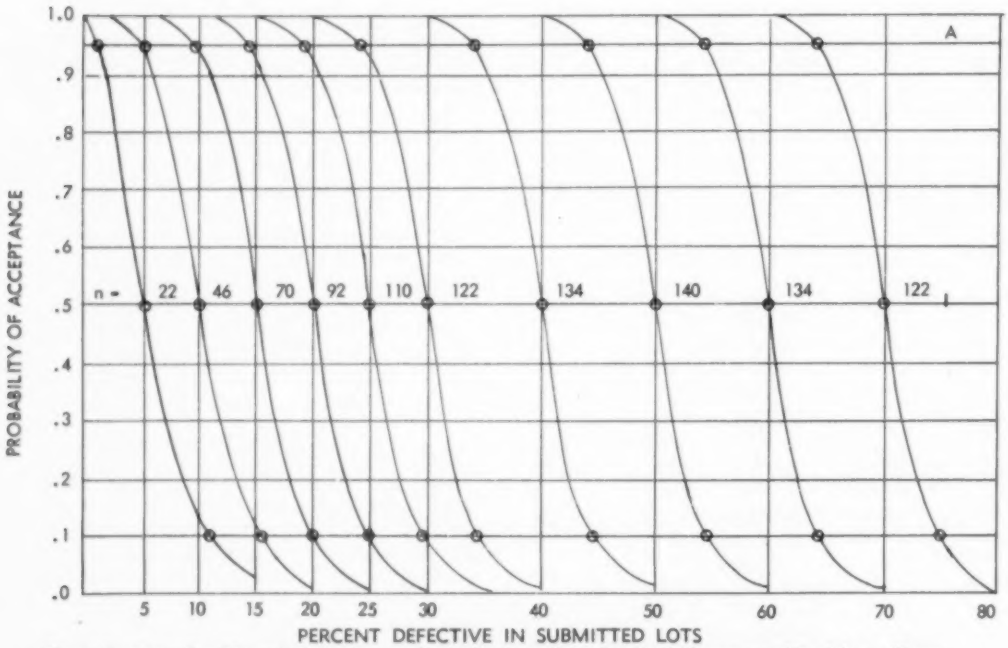


Figure 3—Operating Characteristic Curves—Variables Sampling—Constant Sharpness of Decision— Above: (RQL) — (AQL) = 20%; Below: (RQL) — (AQL) = 10%

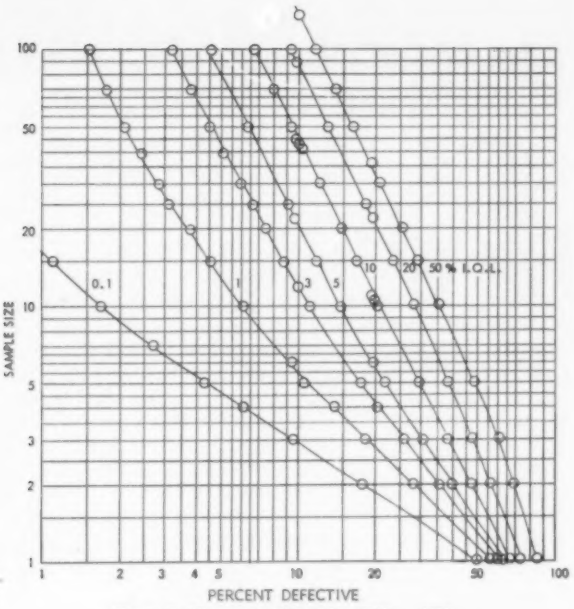


Figure 5—Sharpness of Decision (RQL — AQL)

are useful aids in recognizing trends and other assignable cause variations as well as in determining process capabilities and performance levels. Standard deviations can be estimated from average range data if the sample size is constant and if the process operates in control.

Sharpness of Decision

Figure 1 shows the OC curves corresponding to several selected IQL values and a constant sample size of ten (10). Although it is true that the sample size is independent of the lot size in maintaining a given producer-consumer risk, it becomes quite obvious that the sample size must vary with the IQL if a *constant sharpness of decision* is desired.

It is almost axiomatic that it takes a very small sample size for the decision to accept a lot that has no defectives or to reject a lot that is all defective. But it takes a larger sample size to reach a proper decision about a partially defective lot. These statements can be evaluated quantitatively. The "sharpness of decision" may be defined as the difference between RQL and AQL quality which have 10 percent and 95 percent probability of acceptance, respectively. (Risks other than 10 percent and/or 95 percent could also be specified.)

The sample size necessary to control any given sharpness of decision for any specified IQL can be calculated. Figure 2 shows how sample size varies with IQL to produce a constant sharpness of decision of (a) 10 percent and (b) 20 percent. Figures 3 and 4 show operating characteristic curves with constant sharpness of decision and on each curve is given the required sample size. Finally, Figure 5 shows how the sample size can be selected for any sharpness of decision at several IQL values. Figures 2 and 5 are provided for completeness and may be obtained by proper manipulation of Equation 2 below, but these algebraic details are omitted in this article.

Specification Limits, Sharpness of Decision, IQL and Sample Size

It is true that the sample size is dependent upon the IQL if constant sharpness of decision is desired. However, the appropriate IQL to use is a function of a compromise between specification limits and the producer's process capability, or capability of meeting the specification limits.

Whereas it is recognized that the capability of a producer is a factor, it is probably futile to specify an IQL above about 10 percent. To do so would involve the use of a correspondingly larger sample size in order to segregate an unacceptable partially defective product from an acceptable partially defective product. It is more desirable to (1) obtain a better control over the product through improved methods, processes and/or materials, or (2) modify the specification limits to more nearly line up with available quality.

In any case, the benefits of a constant sample size can be realized by using the results of the first five random specimens for such purposes as control charts, standard deviation from average range, and cumulative frequency distributions.

Figure 6 shows the typical effect of sample size on the sharpness of decision, at 5 percent IQL for example.

Figure 7 shows the operating characteristic curves at 1 percent, 5 percent, and 10 percent IQL with sample sizes of five and ten. These curves

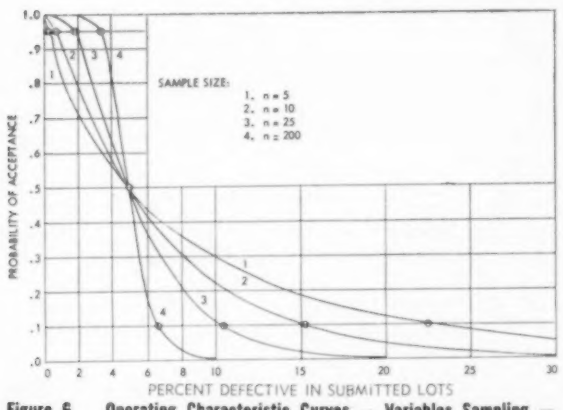


Figure 6 — Operating Characteristic Curves — Variables Sampling — IQL = 5%

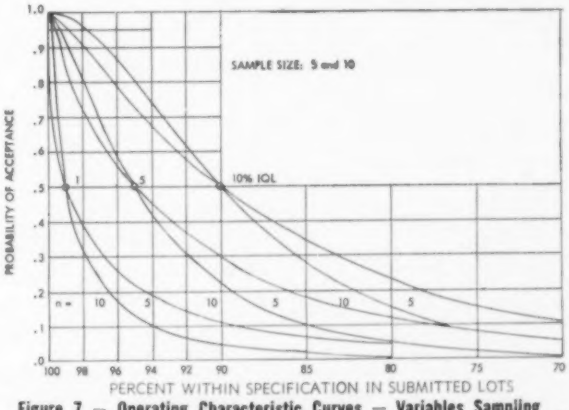


Figure 7 — Operating Characteristic Curves — Variables Sampling — IQC = 1, 5, 10%

show the percent within specification instead of the percent defective. When the question of interrupting an important production schedule is involved, it is important to keep in mind that a product which is 10 percent defective is also 90 percent good. In the case of paper rolls, for example, if 10 percent of the area is out-of-specification (possibly only slightly), there is still 90 percent of the area within specification.

Mathematical Calculations

As pointed out in the various text books, the basic assumption of any variables acceptance plan is that the distribution of item quality follow the normal law. Sample quality is compared with the specification limits as follows:

$\bar{X} + k\sigma \leq$ Spec. Max. for acceptance and/or

$\bar{X} - k\sigma \geq$ Spec. Min. for acceptance,

where $\bar{X}$ is a sample average,

$$R/d_2 \quad \text{or} \quad \sqrt{\frac{\Sigma X^2 - (\Sigma X)^2/n}{n-1}}$$

are estimators of σ', the universe standard deviation, and k is the normal deviate corresponding to the percent defective chosen as IQL.

The probability of acceptance, L_p, of any lot that is p% defective is plotted as an ordinate of the OC curve corresponding to p as abscissa. To find L_p, we begin with the formula

$$K_{L_p} = \frac{k - K_p}{\sqrt{\frac{1}{n} + \frac{k^2}{2(n-1)}}} \qquad (1)$$

where k has already been defined, and K_p, K_{Lp} are normal deviates associated with areas p and L_p under this curve as will be illustrated shortly.

For simplicity, replace (n — 1) by n to obtain

$$K_{L_p} = \sqrt{\frac{2n}{2 + k^2}}\,(k - K_p) \qquad (2)$$

Now suppose we are interested in protection against a lower specification limit (LSL) and that we choose an IQL of 5 percent at this limit. This means that, on the average, lots that contain 5 percent of the items below the LSL should be accepted half the time and rejected half the time. The numerical value of k is 1.645 (normal deviate that cuts off 5 percent area in one tail of a normal curve). We shall accept if $\bar{X} - k\sigma \geq$ LSL and reject otherwise.

Akron-Canton Quality Control Seminar

A Seminar on Quality Control in the Competitive Market will be sponsored May 6, by the ASQC Akron-Canton section in conjunction with the University of Akron.

The morning session will feature Dorian Shainin, QC consultant, who will discuss the "Economics of Planning and Controlling Quality." A. J. Garcia, assistant to the president, Goodyear Tire & Rubber Co., will be the luncheon speaker.

In the afternoon, Mr. Shainin will represent the quality control point of view on a panel composed of prominent executives from the fields of sales, development engineering, accounting, and purchasing. Further information can be obtained from Walter C. Siff, The General Tire & Rubber Co., 1708 Englewood Ave., Akron 9, Ohio.

TABLE I–Solutions of Eq. (2)
IQL = 5%; k = — 1.645; k^2 = 2.706

n	$\frac{2n}{2 + k^2}$	$\sqrt{\frac{2n}{2 + k^2}}$	k	K_{L_p}
5	2.125	1.458	— 2.398	— 2.398 — 1.458K_p
10	4.250	2.061	— 3.390	— 3.390 — 2.061K_p
25	10.625	3.260	— 5.363	— 5.363 — 3.260K_p
200	84.998	9.219	—15.165	—15.165 — 9.219K_p

Using equation (2) above, we build up the entries in Table I noting that here we must give k a negative value.

The OC curve for sample size n = 10, IQL = 5 percent, may then be calculated as shown in Table II. Here p = percent of the lot below LSL; K_p = normal deviate that cuts off p percent of the area in the left tail of the curve; K_{L_p} = computed normal deviate for finding L_p; L_p = percent of area under the normal curve to the left of K_{L_p}, i.e. the probability that a sample of n = 10 for a 5 percent IQL plan will accept a lot that has p percent of the items below LSL.

TABLE II–OC Curve Calculations
IQL = 5% and n = 10

% Defective p		K_p	—2.061K_p	K_{L_p}	L_p
	0.5	—2.575	5.307	1.917	97.2
AQL	0.728	—2.443	5.035	1.645	95.0
	1.	—2.327	4.796	1.406	92.0
	1.5	—2.170	4.472	1.082	86.0
	2.	—2.054	4.233	.843	80.0
	3.	—1.881	3.877	.487	68.7
	4.	—1.751	3.609	.219	58.7
IQL	5.	—1.645	3.390	.000	50.0
	7.	—1.476	3.042	— .348	36.4
	10.	—1.282	2.642	— .748	22.7
	15.	—1.037	2.137	—1.253	10.5
RQL	15.318	—1.033	2.108	—1.282	10.0
	20.	—0.842	1.735	—1.655	4.8
	25.	—0.675	1.391	—1.999	2.3
	30.	—0.524	1.080	—2.310	1.0

The sharpness of decision is 15.3 — 0.7 = 14.6% in this case; i.e., with β = 10%.

If we were seeking protection against lots with p percent beyond an upper specification limit (USL), other conditions as above, we would have k as before (but now with positive sign), K_p values in Table II positive but otherwise unchanged. This would change the sign of each K_{L_p} value, so L_p would now be the area under the normal curve to the *right* of the K_{L_p} value.

Although the preceding mathematics and the accompanying charts apply to variables plans, the same basic ideas could be adapted to attribute plans as well.

As a compromise between producer's and consumer's risks and for simplicity of introducing and visualizing the plan, quality control management may often find it advantageous to select an Indifference Quality Level and an economic sample size.

References

1. Eisenhart, Hastay, and Wallis, "Techniques of Statistical Analysis", McGraw-Hill, 1947, pp. 16-33.
2. Freeman, Friedman, Mosteller, and Wallis, "Sampling Inspection", McGraw-Hill, 1948, p. 145.
3. Hamaker, Taudin Chabot, and Willemze, Philips Technical Review, Vol. 11, (1950), p. 362.

QUALITY CONTROL ENGINEERING

in PROCESS and PRODUCT CONTROL

Figure 2—The Quality Team

ROBERT SCHIN
Western Electric Co.
Allentown, Pa.

A complete program of total quality control for a manufacturing company might well encompass the engineering use of statistical tools in basic product design; evaluation and control of purchased material quality; investigation, analysis and control of manufacturing processes; and rating of quality and reliability of completed product. A wide variety of sampling plans for lot by lot acceptance, rejection or quality rating may be used extensively from incoming materials and parts, within plant processing operations, and on through to completed product. However, the measurement, analysis and eventual economic control of variation in a manufacturing process through the use of Walter A. Shewhart's control chart theory, is today recognized as one of the most important functions of the quality control engineering profession.

Quality Control Program

1. Train engineering and shop personnel in the understanding and use of statistical techniques and controls
2. Make capability studies of each step in the process by:
   A. Collecting data
   B. Analyzing data
   C. Initiating action to eliminate causes of out-of-control conditions
3. Install permanent shop controls to maintain process at optimum economic capability
4. Periodically review controls to adjust to changing conditions
5. Trouble shoot out-of-control conditions after process capability has been achieved
6. Experiment with product design, process conditions and manufacturing facilities to further improve product quality and cost
7. Evaluate and report progress to management

Figure 1

ASQC LCS Codes 100; 300:60; 70:436

Editorial Note

This article by Mr. Schin is the fifth in the series of "Professionalism in Quality Control," articles which are being presented by *Industrial Quality Control*.

MEW

Emphasis on Process Control

The Western Electric Co., with its objective of high quality at minimum cost, has placed considerable emphasis on the control of its own manufacturing processes with the time-honored philosophy, "that you cannot inspect quality into a product, it must be built into it". The effectiveness of this emphasis on process control has provided feedback information for improved product design, reduced inspection effort and considerably reduced scrap, rework and sorting. Needless to say, all of these have contributed substantial savings in manufacturing costs. For example, at the Allentown Works of Western Electric, a plant of 3,000 people, where we manufacture electronic devices, tangible dollar savings have exceeded 20 million dollars since 1952. Western is continually expanding the application of these principles and techniques throughout its many manufacturing locations to optimize economic product quality and reliability. The end result is demonstrated by the outstanding performance and service cost to the users of the world's largest and most complex machine, the Bell Telephone System. This complex communication network has been essentially manufactured by the Western Electric Co.

TABLE I—Quality Control Training
ALLENTOWN WORKS — 1952 - 1958

Course	Hours	Given to	No. of People	Total Hours
Management	10	Staff	15	150
Basic	18	Supv. & Engineers	698	12,564
Refresher	3	Supv. & Engineers	280	840
Short Basic	6	Key Shop Personnel	305	1,830
Sampling Inspection	10	Supv. & Inspectors	36	360
Design of Experiments	21	Engineers	252	5,292
2 Weeks at Universities	80	Engineers	20	1,600
		GRAND TOTAL		22,636

While we do have a total quality control program in Western Electric, which requires the services of many quality control (QC) engineers of professional calibre, I shall describe only the in-process quality control engineering function as it is carried out at the Allentown Works. This job of engineering in-process controls is comprised of seven major facets. (Fig. 1)

"Spreading the Gospel"

The first step in any program is to promote understanding. This applies to top management as well as to all levels of supervision, engineering and operating people. To accomplish this, the quality control engineers have prepared formal training manuals, tailored for specific groups, and have conducted all the in-plant training classes. At the Allentown Works, since 1952, more than 1,000 people have received over 22,000 hours of instruction. (Table I)

Upper management groups are given appreciation courses to enable them to understand and evaluate the overall quality control program. Shop supervisors and product engineers are given an 18-hour basic course. This course includes statistical quality control theory and application, in addition to such subjects as interpretation of control chart patterns, the value and results of a complete process control program, and how to instill and maintain quality consciousness. Each participant is given enough training to understand the results of the statistical techniques used and to relate these results to his own practical or theoretical knowledge of the product or process. Key shop personnel such as layout operators, machine setters and process checkers are given a six-hour course covering application of basic techniques to provide them with a working knowledge of the statistical tools involved. In order to maintain plant-wide understanding, most courses are up-dated and repeated annually for new personnel. Supplementing this formal training, each QC engineer carries on a continuous educational program in his day-to-day contacts.

A basic philosohy of the Western Electric Company is to hold each operating shop responsible for the quality and cost of products they produce. Therefore, it is vitally important for first-line shop supervisors and their key people to thoroughly understand and accept the process controls used on their job. They must be convinced of the value of the control chart to the extent that they use it daily for efficient control. The QC engineer develops and installs these process controls and instructions for the shop to use in controlling their own processes.

The training function is considered by Western as extremely important to the success of a quality control program. The QC engineer, to carry out this phase

TABLE II—Silicon Alloy Varistor Losses

Operations	December 1955 Net $ Value of Defectives
Cut Wire	14.84
Wire Stud	22.57
Copper Pin	10.20
Wire Stud Assembly	128.41
Silicon Wafer	271.39
Alloyed Wafer	926.13
Etched Pin-Wafer Assembly	2,959.31
Assembled Varistor	338.36
TESTED VARISTOR	8,213.45
TOTAL	12,050.44

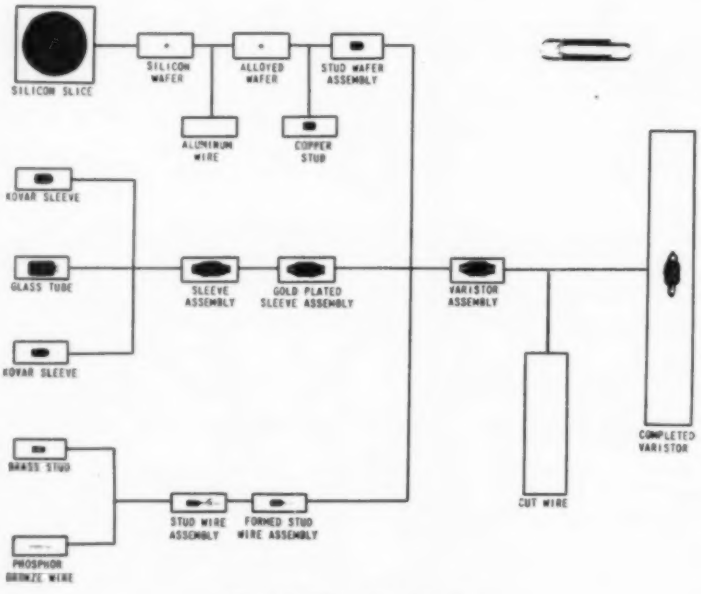


Figure 3—Silicon Alloy Varistor

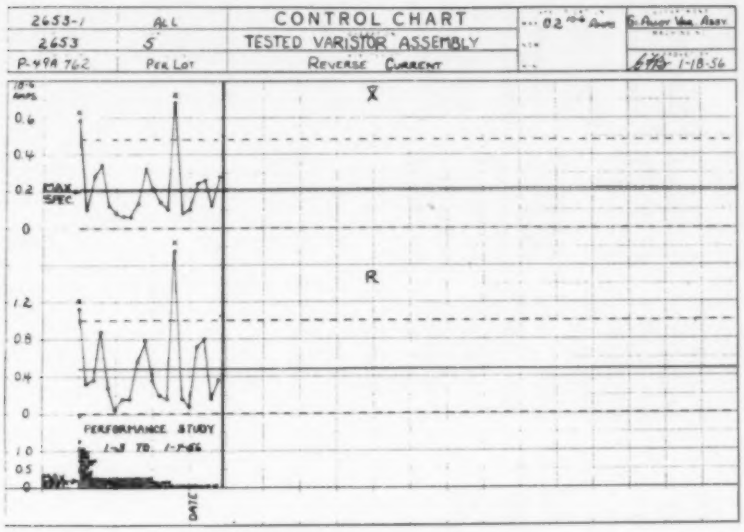


Figure 4—Performance Study Control Chart

of his job, must have sufficient statistical knowledge to simplify SQC theory and practice for use of shop personnel as well as to answer all questions that might be asked. Equally important, he must be a good instructor to convey understanding and acceptance of statistical techniques to people totally unfamiliar with these concepts.

As part of the overall program, many of Western's QC Engineers have contributed material during the past three or four years for preparation of a company handbook which was published in 1958. This book records those elements of our quality control program which have been proved by actual practice to be economically sound. Every shop supervisor and product engineer has received a personal copy of this handbook which he is expected to use for self-education and reference. Each QC engineer is expected to be completely familiar with this book to the extent that he can use and understand every principle and technique.

The Quality Team Approach

We have found that the installation and continuous operation of in-process controls can be most effectively carried out by "Quality Teams". (Fig. 2) Each production line has its team, composed of the shop supervisor, product engineer and QC engineer. Each member brings to the group his specialized knowledge. The shop supervisor brings practical knowledge. The product engineer brings product theory as well as equipment and process experience. The QC engineer supplies both technical and statistical background. All three men on these teams are of equal stature in the eyes of the company. This provides a necessary atmosphere of mutual respect and cooperation. In practice, each QC engineer is a member of a number of quality teams, covering several product lines. The product engineer and shop supervisor, on the other hand, are usually assigned to a single product line. The combined knowledge and exchange of ideas at weekly or monthly team meetings have been found to be the best method of accomplishing process control objectives.

The manner in which a quality team approaches the actual installation and constant improvement of process controls can perhaps be best illustrated with a specific example. I have selected as an example the Silicon Alloy Varistor, a product manufactured at the Allentown Works. This is a semi-conductor device, primarily intended for use as a rectifier and voltage limiter in telephone transmission equipment. While it is relatively simple in appearance, stringent electrical requirements make its manufacture a very exacting process.

Figue 3 shows a picture of a completed varistor and the components used in its assembly. On the top line, a slice cut from a silicon ingot is diced into 45-mil square wafers. The wafer, in turn, is alloyed with aluminum derived from the aluminum wire. The alloyed wafer is then soldered on to the copper stud, forming the stud wafer assembly. On the bottom line, a 10-mil phosphor bronze wire is inserted and soldered into a hole of the brass stud, thereby making the stud wire assembly. The wire portion of this assembly is formed into an "S" shape to insure a spring contact. These wire and wafer assemblies are force-fitted into opposite ends of the sleeve assembly, shown in the center line, which consists of two kovar sleeves fused to a multiform glass tube. Wire leads are then soldered to each end of the varistor, thus completing the assembly. The paper clip is shown for comparison of size.

Manufacture of this product was started in late 1955, and the process control program was initiated at the same time. At the first meeting of the Quality Team, the QC Engineer present-

TABLE III—Breakdown of Test Defects

Type Defect	Percent of Defects
Forward Voltage	5.3%
Slope	0.3
REVERSE CURRENT	**59.7**
Open	4.9
Shorts	10.6
Zener Voltage	19.2

TABLE IV—Factors Affecting High Reverse Rejects

Prior Operation	Factor
Silicon Dicing	Wafer Width
Alloying	Temperature Belt Speed
Wafer Assembly	Chips Cracks Off Center Buttons Cleanliness
Pin Assembly	Alignment Shape of "S" Bend

ed a breakdown of the cost of defectives (Table II) for a representative period. It was readily apparent that a high proportion of the defectives was dropping out at the testing operation. Attention was therefore directed to this item of greatest loss for the first process capability study. Further analysis showed that 60 percent of the testing defects were due to high reverse current (Table III). The team agreed to gather variables data and plot an $\bar{X}$ and R chart on this characteristic. The performance study made from January 3 to January 7 (Fig. 4) showed out-of-control conditions on both average and range as indicated by the x's. Note that the grand average, or center of distribution is also above the maximum specification.

The QC engineer has focused shop and engineering attention on the major problem, so that their skills and knowledge may be directed to an early solution. He now guides the interpretation and analysis of the data. From their knowledge of the product and processes, all members of the Quality Team suggest the factors at prior operations which they believe might be responsible for the erratic high reverse losses (Table IV). In silicon dicing, the wafer width was considered important; at alloying, temperature and belt speed were important factors; at wafer assembly, chips, cracks, off-center buttons and cleanliness; at pin assembly, alignment and shape of "S" bend. The team then decided to collect data and plot charts at each of these operations. Let's examine these charts to see the results obtained.

Initial variables data on wafer width (Fig. 5) indicated a controlled process capable of meeting specification, but not properly centered. A series of dicing machine adjustments and operator instructions over a period of seven weeks eliminated all oversize wafers from the process.

At alloying, a percent defective chart (Fig. 6) for visual defects indicated unstable conditions with about 30 percent of the units unsuitable for further processing. Sorting was introduced temporarily while the effects of lower furnace temperatures were studied. A reduction in temperature from 900° to 800° almost completely eliminated visual defects.

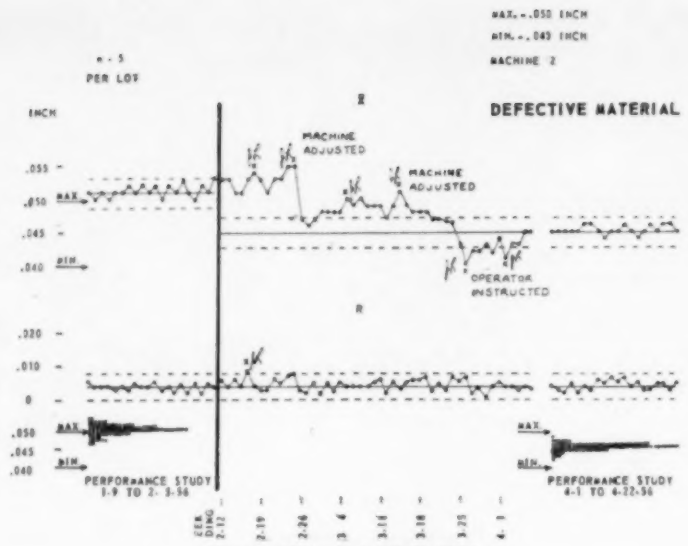


Figure 5—Silicon Dicing Wafer Width

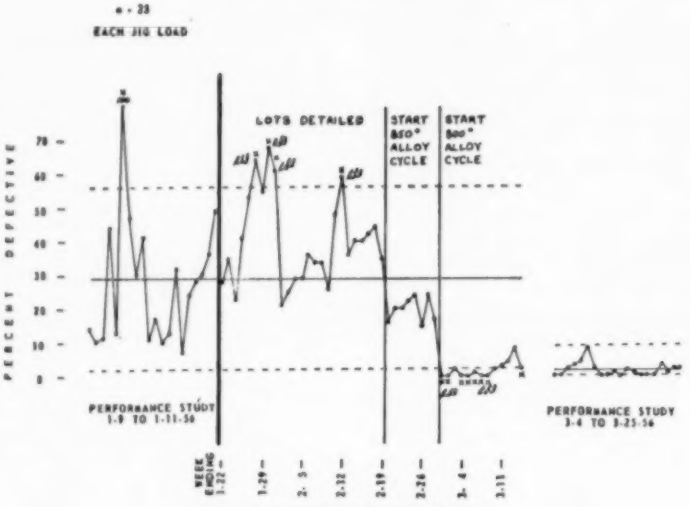


Figure 6—Alloyed Wafer Visual Defects

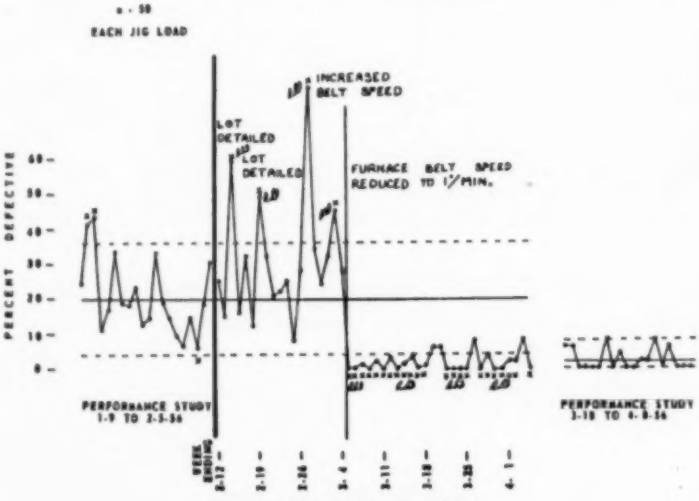


Figure 7—Alloyed Wafer Plate Check

An electrical check made on the alloyed wafer (Fig. 7) also showed process instability, averaging about 20 percent defective. After reducing furnace temperature to eliminate visual defects, the belt speed was adjusted to determine the effect on the electrical characteristic. Increased belt speed raised the level of defects; reducing the belt speed from 1½" per minute to 1" per minute, decreased the electrical dropouts to an average level of about 2 percent.

At wafer assembly, where the alloyed wafer is soldered to one end of the stud, the skill of the operators was involved. Therefore, separate percent defective charts were plotted for each operator. Off-center and cracked wafers were the major causes of erratic performance. Clarification of the assembly techniques, involving handling and location of wafers, as well as soldering temperature and time, were established through an operator conference with the Quality Team. Within one month after the initial study, visual defects at this operation were almost completely eliminated.

A simultaneous study on the formed pin assembly (Fig. 9) resulted in modification of a forming tool which stabilized the operation and reduced repairs from about 35 percent to less than 10 percent.

In seeking improvement and control for one final electrical characteristic, the team found it necessary to investigate these earlier operations. Separate capability studies were necessary to bring each one into a state of control. By working back to basic causes affecting a process and instituting control of them, an overall process capability can be achieved. Coming back to the original objective to reduce electrical dropouts at final test, Figure 10 shows the results for reverse current after the earlier operations were stabilized. The percentage of defectives was reduced from 60 percent to 3 percent in approximately three months

The Quality Team does not cease to function when capabilities are attained. To maintain continuous control of the processes, shop charts and instructions must be planned and installed. These controls must be reviewed periodically and ad-

WHATEVER YOUR NON-DESTRUCTIVE TESTING PROBLEM

CONTACT—Curtiss-Wright, the world's most complete source for non-destructive testing engineering and equipment.

RESULT—Unbiased recommendations as to the testing method best suited to your particular operation.

ULTRASONIC TESTING
CONTACT AND IMMERSION TECHNIQUES

RADIOGRAPHY
X-RAY • ISOTOPE • BETATRON

FLUORESCENT DYE PENETRANTS

TEMPERATURE-INDICATING PAINTS AND CRAYONS

Call, write or phone the Non-Destructive Testing Department

PRINCETON DIVISION
CURTISS-WRIGHT
CORPORATION • BOX 110, PRINCETON, N. J.
SWinburne 9-0500

In Canada contact
CANADIAN CURTISS-WRIGHT LIMITED, 1980 SHERBROOKE STREET WEST, MONTREAL, P.Q., CANADA

justed to changing shop conditions. Charts must be discontinued when no longer of any value for control. Checking intervals must be extended to minimize quality checking costs as greater process stability develops. New charts may also have to be added as other unstable process variables are uncovered. The team must meet on a regular schedule to review all charts and work together to track down and eliminate causes of out-of-control conditions which creep into the process. Changing materials, new operators, machine wear, or adjustments due to maintenance can upset the control of basic variables. After the capability of a manufacturing process has been achieved, we may still not be satisfied with the final results. With a controlled process, it is then possible to experiment with product design and processes to make further improvement through the use of statistically designed experiments.

This example has demonstrated how we install and maintain an in-process quality control program. The Quality Team has been shown as the key agent to accomplish the objectives. The QC engineer, as a member of this team, is an integral part of the manufacturing group. To stimulate and guide the team activities, he must have a technical background to quickly and fully understand the manufacturing process and its problems. He must thoroughly understand and be able to properly apply the many SQC techniques. He must be the spark-plug and prime mover of the Quality Team, reaching ahead for improvement, initiating experiments, and guiding the team to new solutions of manufacturing problems.

Measuring Results

It is essential for any functional group to satisfy its management that their work is contributing to the overall benefit of the company. The QC engineer must likewise substantiate his efforts. One of several yardsticks used successfully at Allentown is the comparison of junk, repair and sorting costs, called Merchandise Losses, with the value of good product manufactured each month. For example, on the Silicon Alloy Varistor job, the reduction of merchandise losses,

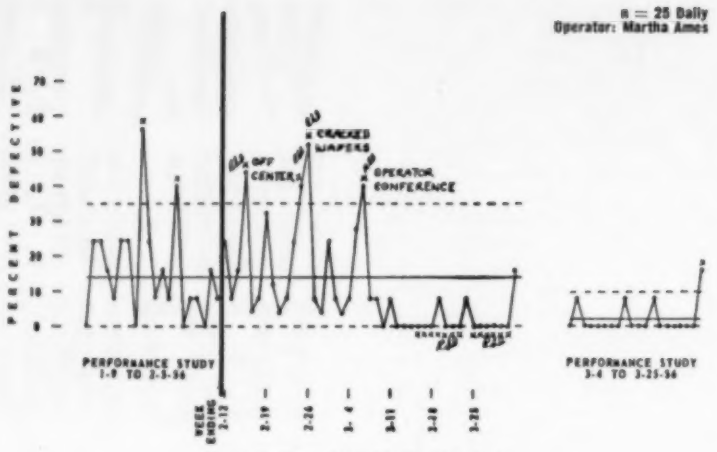


Figure 8—Wafer Assembly Visual Defects

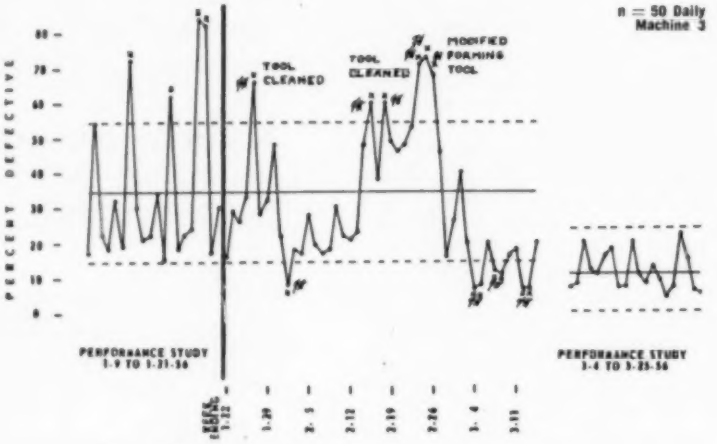


Figure 9—Formed Pin Assembly Alignment and Shape of "S" Bend

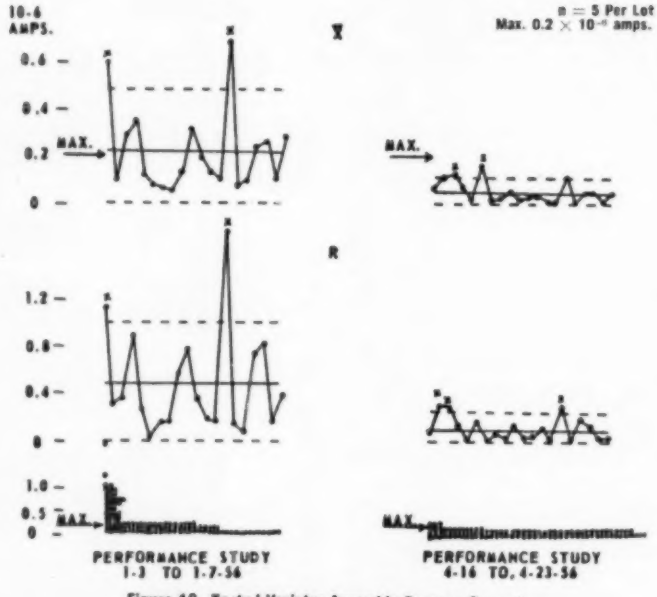


Figure 10—Tested Varistor Assembly Reverse Current

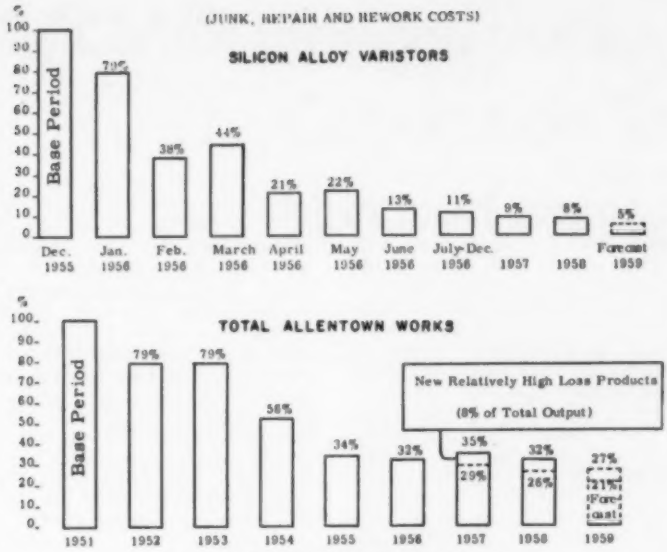


Figure 11—Reduction in Merchandise Losses

using December 1955 as a base period (Fig. 11, top), portrays the rapid progress made during the period when initial capability studies were being conducted. Much credit is also given to the Quality Team for the continuing stability and steady improvement shown up to the present time. The QC engineer is required to forecast at the beginning of each year the improvement expected in merchandise losses by the end of the year. One measure of his performance is the attainment of these objectives. Reports and forecasts like this one for each product line are summarized into an overall chart for the Allentown Works (Fig. 11, bottom). These charts, of course, reflect total improvement which is attributable to other things as well as the use of SQC. However, of this total plant picture, almost 50 percent of the improvement since 1951, can be directly tied to the Quality Control Program. Probably some of this improvement would have been achieved eventually without SQC, but the cost of waiting for "osmosis" to take place would have been excessively high.

Concurrent with cost reduction through process control, the quality of finished product must, of course, be rigidly maintained or improved. The Demerit Index, a quality rating to customer standards, is another yardstick by which management measures the effectiveness of its Quality Control program. The Allentown Works' overall Index (Fig. 12) shows consistent and steadily improving results.

The Engineering Challenge

At the Allentown Works, over 500 different codes of product are manufactured each month on about 25 separate production lines. Over 4,000 different operations are being performed daily. Although only 30 percent of these operations vary sufficiently to warrant process controls, it requires over 5,000 control charts and 700 process control and inspection layouts to keep our manufacturing processes at top performance. New codes requiring new facilities and new processes are continually being introduced into manufacture. Time intervals from research to design to manufacture are being continually reduced. New products nearly always demand more stringent requirements. To keep pace with new science and new technology, we must quickly shake down, refine, and control our manufacturing operations. At Allentown and throughout Western Electric, the QC engineer is playing an increasingly important role in the attainment of these objectives.

Our Quality Control program was started and has been continued with graduate engineers from many engineering fields, such as electrical, mechanical, chemical and industrial. They were given intensive training in Statistical QC, both by the company and at various universities. I am looking forward to the day when a comprehensive statistical program will be included in an undergraduate curriculum and a full-fledged quality control engineer is made available to industry. At present, only a few graduate schools, such as Rutgers, offer a full training program in engineering statistics.

Our program has been successful only because of the calibre and training of the men assigned to the job. I am convinced, and so is the Western Electric Co., that it is only by this combination of technical and statistical skill that a man can be equipped to meet today's quality control engineering challenge in industry.

As industry discovers that Quality Control can achieve greater productivity, better quality and lower costs, it will come to recognize and accept the Quality Control Engineering profession.

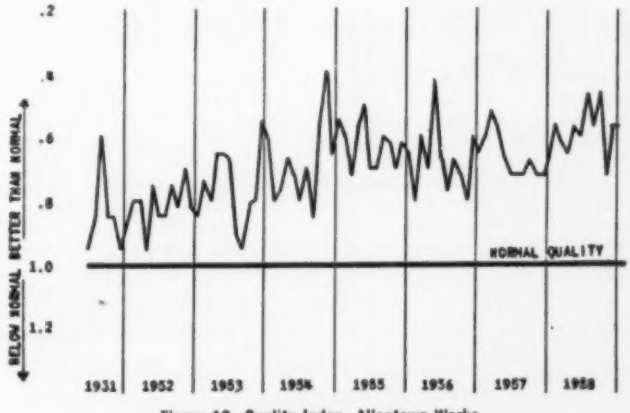
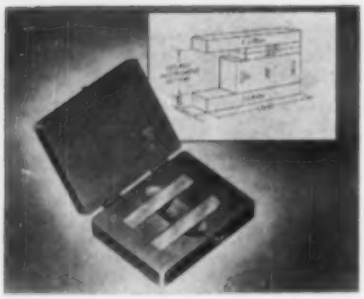


Figure 12—Quality Index—Allentown Works

What's New?

ROY A. WYLIE, *Editor*
Ampex Corporation



P-4-2—New Ellstrom Master Parallels provide an accurate, fast and easy means for setting internal measuring instruments. In use, it is only necessary to assemble the gage block combination required to obtain the desired instrument setting, then wring on the Master Parallels as shown on the illustration. No clamps or holders are needed. Made of long-wearing carbide, the Master Parallels feature an ultra fine precision finish and gaging surfaces which are unconditionally guaranteed for flatness to within 0.000003 of an inch. They are offered in pairs in special slotted cases.

* * *

P-3-9—The Robbins Indicator Gage is designed to provide a quick and simple means for inspection and production personnel to check accurately 90 degree work angles. However, it can also be used in conjunction with Robbins angular sine plates to check the precision of angles other than 90 degrees. Also, such items as mounted die details can be checked for relative position by using gage blocks in combination with the indicator gage. The Robbins 90 degree indicator gage is furnished complete with dial indicator "Master" square and a hinged hardwood box for protective storage. The Dial gage has standard A.G.A. mounting and registers plus or minus errors in workpiece to one ten-thousandth of an inch. The "Master" square serves as an accurate reference for setting and checking the indicator gage. The distance between the two contact points can be quickly changed over a range from 1-1/8 inches to 17-3/4 inches. Convenient hand screws on both contact point brackets are easily loosened and tightened when making this adjustment. Also, contact point brackets are spring loaded to prevent inadvertent slipping while spacing adjustments are being made.

P-3-1—S-B Polarimeters have announced four models ranging in size from a portable model with a 6 inch diameter field to a floor model with a 16 inch square field. Each of the polarimeters has a Friedel compensating eyepiece to allow measurement of stress in glass. As with an ordinary polariscope, a piece of strained glass placed on the field shows strains in various colors. However, the eyepiece is arranged so that it may be rotated and it has an angular scale by which the amount of rotation may be measured in degrees. Underneath the eyepiece is a quarter-wave plate which may be moved into the light path. By rotating the eyepiece with the quarter-wave plate in position, the effect of the strain in the glass is compensated for or neutralized and the amount of rotation in degrees required to obtain compensation is a measure of the stress in the glass. Compensation has been obtained when the eyepiece has been rotated to the point where the portion of the glass under observation has become dark. Stress in pounds per square inch is obtained by substituting in a formula the angle of rotation in degrees, a constant for the thickness of the glass, and another constant for its composition. To simplify the computation of stress, a slide rule is supplied with each S-B polarimeter. Specially designed scales make it possible to compute stress with one setting of the slide and the scales are simplified so that inexperienced personnel can learn to use the slide rule in a few minutes. Prices range from $270 for the portable model to $450 for the large floor model.

* * *

P-3-5—A new line of dial indicators and an indicator stand has been introduced by Scherr-Tumico. One of the new Mauser Indicators is direct reading in 0.00005 inches with a full range of dial of 0.004 inches and 20-0-20 graduations. The other model is direct reading in 0.0005 inches, 0.016 inches full dial range and 8-0-8 graduations. Both models have a fine cam-lock adjustment for zeroing of the Indicator which cannot be disturbed by shocks or accidental contact with hands or objects. Possible damage to the indicator is prevented by an extra lift of 5/32 inch over the scale range. The mechanism is fully jeweled and shockproof. Tolerance is set by means of 2 red tolerance hands adjustable from the outside. Indicators come in a transparent unbreakable plastic case and include a cable release at no extra cost. A large variety of contact tops is avaliable from stock. The new Mauser Indicator Stand is designed as companion to the new Dial Indicators. It has a 6 inch capacity with a 2-1/2 inch diameter hardened, ground and lapped steel table specially shaped to accommodate odd pieces. A knurled ring provides a fine adjustment of the verticle setting and an out-of-the-way knob provides instant locking. The price of the 0.00005 inch Model Indicator is $32.50. The price of the 0.0005 inch model Indicator is $16. The indicator stand sells for $29.75.

* * *

P-4-4—Low cost, wide application range and simplicity of operation are features of the Model 902 Transist-O-Check, a portable battery-powered transistor tester just announced. Designed to meet laboratory, production, incoming inspection and electronics shop requirements for simple and rapid testing of low and medium power transistors, the instrument checks the most significant transistor characteristics, D. C. beta, Icbo and Iceo, as well as the existence of collector-to-base and collector-to-emitter shorts. Completely self-contained, the Transist-O-Check operates from an internal easily replaced six volt battery and incorporates a wide-view 50 microampere meter for direct reading of current values. All functions are controlled by two switches: an NPN-PNP switch and a Test Selector. A single standard 3-pin socket accommodates most transistors, with flexible clip leads provided for checking untrimmed transistors and special base types. Tests are performed at a constant collector voltage of 6 volts and cover a beta range of 0 to 5 milliamperes. The unit measures 7-¼ inches by 4-⅜ inches by 4-⅛ inches and is priced at $49.75. Other versions, to meet particular requirements, can be supplied on special order.

Continued on page 23

Your Cordial Invitation to the

Pre-Convention Reception

Monday Evening, May 23, 6-9:30 pm

To bid you welcome as you arrive in San Francisco May 23, members of the 14th Annual Convention and Exhibition committee will host a reception from 6 to 9:30 p.m.

The main attraction for this event will be a wine tasting session, which has been arranged for us by the Wine Institute, which is located in San Francisco.

The Institute has arranged for several of the California Wineries to participate, and each of them will have their various types of wine to sample and taste—so we may find out for ourselves the high quality of wines that are produced in California.

Along with the wines, you will be served cheese and bread. The committee has been advised that a simple food is desirous because other types of food would detract from the flavor and bouquet of the wines.

National Wine Queen
June Adler

A simple key which will help you in classifying and remembering the name of any wine is based on the idea that if wines are grouped according to their uses, every wine in the world can be placed in one of five main divisions.

While there are innumerable wine names in use throughout the world, only a limited number are generally known in the United States. Of these, about a dozen are very well known—Sherry, Burgundy, Sauterne, Port and Champagne, for example. These wines head the list under each of five classes of wine—appetizer wines, red dinner wines, white dinner wines, dessert wines, and sparkling wines.

In addition to the wine tasting event, the committee has also arranged for music and entertainment to provide an evening of good western fellowship and hospitality.

And .... Introducing the 14TH ANNUAL CONVENTION HOST COMMITTEE

THREE CHEERS go to this group of San Francisco Bay Area Section members! These eight persons (and six others not pictured) are members of the ASQC host committee for our convention at the Sheraton Palace in Frisco May 24-26. Left to right around the table: Gerry Desmond (reception); Gerry Lieberman (program); Allan Hull (publicity); Lyle Connell (section secretary); Harter Hudson (general chairman); Stan Hotchner (section chairman); Allen Chop (registration). and Ron Berkhimer (arrangements). Not pictured are Franklin Hunsicker (vice chairman); Walt Hurd (special projects); Frank Cardoza (exhibits); R. Calvert Haws (Western QC conference council chairman), and Alice Hudson and Lou Hile, ladies' program.

MID PACIFIC

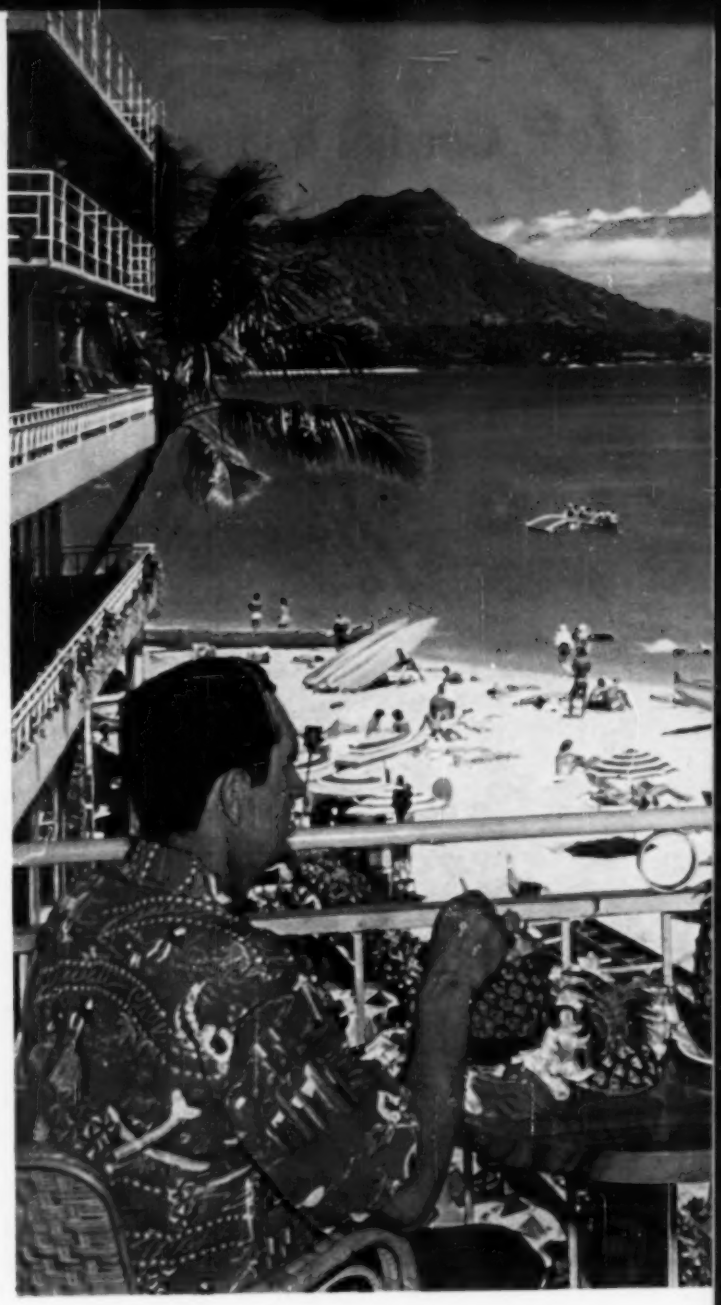
Honolulu

Immediately following your American Society for Quality Control May 24-26 Convention in fabulous San Francisco, many will want to continue on to beautiful Honolulu to attend ASQC's Mid-Pacific Quality Control Conference. The dates of the conference will be May 27 through June 2.

Sessions will be held the fourth, fifth and sixth days, featuring:

Administrative applications; canning, brewing, fishing, chemical, textile, and reliability technical sessions, and plant tours.

This is an opportunity of a life-time you will not want to miss. You will depart from San Francisco via United Air Lines DC-8 Jet Mainliner at 8:45 am Friday, the 27th of May, arriving at 12:05 noon. You will leave the Islands late on the afternoon of June 2, arriving in Frisco, or Los Angeles if you prefer, that evening.



Conference Spe

Reliability Test Programs MARTIN H. SALTA

Reliability Definition, Control and Improvement BERNARD HECHT

An Evaluation of Quality Control and Quality Cost A. W. WORTHAM

What Constitutes the Total Price of a Purchase? R. CALVERT HAWS

Mathematical Aspects of Reliability S. SUGIHARA

Ammunition Depot Quality Control and Reliability Problems CAPT. B. L. LUBELSKY

QC CONFERENCE

Hawaii

Between times, you will be thrilled by a sight-seeing trip around the island of Oahu or to Mt. Tantalus, where you will see Pearl Harbor, and the colorful and traditional Imu ceremonies on the oceanside of the Hawaiian Village Hotel, your home in the Islands for six nights.

Many other side trips, including flying trips to the nearby islands, will be available for you to take.

Colorful folders describing the Mid-Pacific Conference in Hawaii—our 50th state—may be obtained by writing to ASQC, Travel Secretary, c/o United Air Lines, 36 S. Wabash Ave., Chicago 3, Ill.

Reservations are now being made at the Society's Headquarters, 161 W. Wisconsin, Milwaukee 3, Wis., for either or both meetings.

kers and Topics

Breaking the Management Barrier to Reliability — J. Y. McCLURE

Total Quality Control — A. V. FEIGENBAUM

Models of Continuous Sampling — GERALD J. LIEBERMAN

Surveillance of Stored Material — HERBERT K. SOLOMON

Plant Tours (3rd Day)

Hawaiian Pineapple Company

Oahu Sugar Company

Brownies Perfume Factory

14th Annual Convention and Exhibition

Tuesday-Wednesday-Thursday May 24-26

Hotel Sheraton Palace, San Francisco, California

A revealing talk about our broad range of missiles, aircraft, and related weapon systems for Naval operations will be a big feature of your ASQC convention in San Francisco May 24-26.

The chief of the new Bureau of Naval Weapons, Rear Admiral Paul D. Stroop, will open the Wednesday, May 25, sessions with his talk, "Reliability of Guided Missiles."

In addition to the two talks, 46 sessions and six panel discussions will be on the docket . . . on the business side. On the lighter side will be a gala Hawaiian night; a "Barbary Coast" social evening; the annual banquet, and interesting plant tours.

Admiral Stroop, a graduate of the U.S. Naval Academy at Annapolis in 1926, has had a long, varied, and distinguished career dealing with Naval weapons and aviation. He has been a plotting room officer in fleet gunnery; aviator; Norden bombsight specialist; commander of four ships (three during wartime), and commander of a Naval ordnance test station.

He was deputy and assistant chief of the Bureau of Ordnance from December, 1954, until April, 1957, returning in March, 1958, as chief of that bureau. He was named chief of the Bureau of Naval Weapons Sept. 10, 1959.

INTRODUCING
Our May 25th Speaker

PAUL D. STROOP
Rear Admiral
U. S. Navy

Reservations may be made now for the San Francisco convention at the Sheraton Palace by contacting your ASQC headquarters at 161 W. Wisconsin Ave., Milwaukee, Wis. You may also make reservations for the subsequent ASQC Mid-Pacific conference in Honolulu May 27-June 2. A convention brochure giving the complete agenda in Frisco (including a fine program for the ladies) was mailed recently to all ASQC members. If you desire another copy, please let us know.

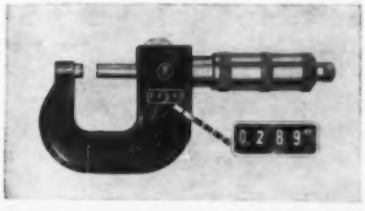
Quality Control—The Golden Gate to Higher Profits

P-4-3—The Gelman membrane filter is available with holes so small that it can remove the small virus particles from solutions. Its smooth surface makes it ideal for examination of contaminants in air, fuel and hydraulic fluids. Bacteriologists may use the membrane filter to quickly concentrate and identify micro-organisms. Medical researchers use the membrane filter to cold sterilize serums, vaccines and biological materials. Engineers find the membrane filter can effectively remove particles from water, fuel, hydraulic fluids and critical air supplies. It may be used for evaluating the cleanliness of liquids and gases, since particles filtered from a test batch of liquid or gas can be immediately viewed under the microscope for total particle count or size determination. In the Food and Beverage Industry, the membrane may be used for sterilization of juices and soft drinks. It is used as a final filter to obtain optically clear beverages. The membrane filter is made in sizes to fit existing filter presses and filtering equipment.

* * *

P-4-1—A new line of self-generating accelerometers featuring 500° F temperature operation and less than 3 percent cross-axis (lateral) sensitivity is now being introduced for missile and aircraft vibration testing and for general industrial measuring applications. The accelerometer's first resonant frequency of 50 KC widens the frequency range of vibration data that can be monitored. Its 1600 uufd internal capacity reduces the effects of cable loss. This, along with its high temperature stability, permits installing the unit nearer to "hot spots", while protecting a companion pre-amplifier by installing it further away. Other features include maximum acceleration of 5000 g, hermetically sealed case (optional hermetically sealed cable and connector), high output for a given capsule size and accurate calibration for reliable repeat measurements. Clevite Bulletin 9503 lists specifications and prices for three standard models: 5 mu/g, 10 mu/g and 20 mu/g sensitivity.

* * *



P-4-5—A new micrometer that dials visual readings automatically has just been introduced by Glass Laboratories, Inc. The D.R. (Direct Reading) Micrometer eliminates human error by providing automatic and exact dial readings from zero to 1 inch. It is fitted with a friction stop and lock screw. The measuring faces are made of tungsten and carbide. An accessory stand is available for desk or bench. The Micrometer sells for $35.00 in the 0-1 inch size and $38.00 in the 1 inch to 2 inch size. Accessory stands sell for $10.00.

* * *

P-4-6—A versatile and comparatively low-priced electronic gaging and classifying unit has been announced by Federal Products Corporation. The Model 230 M-27 has eight ranges from ± 0.020 inch to ± 0.0001 inch, four size control limits and five sorting categories. Several gage head combinations can be used with this unit. With the addition of an adaptor, two or more gage heads can be switched to the amplifier individually or used in combination. Furthermore, the gage heads can be arranged so that their outputs are either additive or subtractive, enabling the gage to be used for measuring areas as well as dimensions or where there is need to weigh certain dimensions in accordance with the constants of a mathematical equation. Electro-Probe gage heads with either lever type or pantograph-mounted contacts are furnished with the unit. Model 230 M-27 consists of a voltage regulated vacuum tube amplifier, a four-limit classifier, power supply, meter, number display tube, and associated circuitry. This is all contained in a single chassis which can be supplied in a compact cabinet or separately for mounting in a standard 19 inch rack. If desired, the unit can be supplied, less classifier, for laboratory or bench use. Any one of the eight ranges can be selected with the panel-mounted switch. A 5 inch precision meter displays the selected range on one of the three separate scales which provide a choice of 10, or 50 graduations on either side of zero. The classifier like the amplifier, employs vacuum tubes and printed wiring. It provides five classification categories by means of four adjustable control limits, each terminating in a set of normally open, 10 ampere relay contacts. A panel-mounted "Nixie" display tube indicates categories by actual number, starting with zero which represents the condition where no limits are actuated.

* * *

P-4-7— Hewlett-Packard has announced a compact precision frequency standard, providing a stability of $5/10^8$ parts per week and $3/18^8$ over short intervals. The Model 100 ER standard provides high stability and offers a wide variety of output signals. Signals available include six sinusoidal frequencies (10 cps, 100 cps, 1 KC, 10 KC, 100 KC and 1 MC) and four pulse signals (10 cps, 100 cps, 1 KC and 10 KC). These may be distributed for use at many different stations on a production line or in the laboratory. The frequency standard includes a timing comb for calibrating, and for measurement of sweeps and time intervals. It also has a built-in oscilloscope for Lissajous comparisons. Rated load of the instrument is 50 ohms at 1 MC and 100 KC, and 5,000 ohms at the lower frequencies. Model 100 ER is extremely compact - 8-3/4 inches high, 19 inches wide and 18 inches deep, and weighs 35 pounds. The new frequency standard is priced at $900.00.

New Literature Available

L-3-6—A 36-page booklet available from Harry Miller Corp. describes wet magnetic particle inspection using Immunol 438 in water as the vehicle for oil soluble and water soluble inspection pastes instead of kerosene or solvents. Suggested advantages are better definition of flaw, substantial cost reduction, cleaning and rustproofing; and the elimination of fire hazard, skin infection, inhalation hazards, odor and foam. The booklet cites Air Force Specifications amended to approve the water suspendable method of magnetic particle inspection, provided a suitable rust inhibitor and wetting agent are used and approving Immunol 438 specifically for the water phase vehicle.

DO YOU HAVE A QUALITY CONTROL PRESENTATION PROBLEM?

QUALITY CONTROL AIDS ARE THE ANSWER

Make your presentation more forceful and understandable by the use of these aids.

QUINCUNX
... This device permits your audience to visualize the creation of a normal distribution pattern as well as the results of variables sampling. All beads are self-contained; nothing to drop out. Done in attractive mahogany complete with zipper carrying case.

ATTRIBUTE SAMPLING DEMONSTRATOR
Complete unit consists of transparent plastic container, opaque colored beads, and wood paddles permitting easy identification of beads at a distance.

SIMULTATORS
... To demonstrate control chart plotting and shift of distribution pattern.

Lightning Calculator Co.

Box 6192

St. Petersburg Beach 6, Fla.

L-3-7—Bulletin 659 describes a new Right-A-Weigh one-pan substitution-weighing analytical balance. The redesigned balance has many new features and provides fast, accurate, convenient, reliable weighings.

* * *

L-3-8—Petz-Emery, Inc. has just released Bulletin "F" describing their newest design in lightweight portable comparators, "The Model B 2". The Bulletin lists the four A.G.D. dial gage sizes, capacities and ranges available for the Model B 2, and gives full particulars concerning the physical specifications of the comparator.

* * *

L-4-1—New literature describing the stainless steel gage blocks recently announced by the DoAll Company is now available. It gives full information about the available sets, grades and prices.

* * *

L-4-2—New accessories and improvements for metal testing equipment are described in a supplement to the Riehle Recorder and Accessories Catalog. Included in the supplement are specifications on such metal testing equipment as the Riehle Model DV series of extensometers for vacuum and controlled atmosphere furnaces, the Model DBX 48 bolt extensometer, DND 10-20 dual range room temperature extensometer, Model DH 1-10 dual range high temperature extensometer, Model DHT-100 crosshead motion transmitter, automatic strain rate controller, axial alignment checker and signal converter.

* * *

L-4-3—Lourdes Instrument Corporation has published a 16-page illustrated catalog announcing 13 improved models of its super-speed centrifuges. Complete with specifications and other information, the catalog is printed with photographs and diagrams showing full details. Almost all the centrifuges are made to permit interchangeability with a choice of 10 different angle rotors.

* * *

L-4-4—A new four page folder describing the various models of the Hastings Air-Meters is now available from the manufacturer. Hastings Heated Thermopile Air-Meter instruments, compensated for temperature and rate of change of temperature are used for precision measurement of air velocity in industrial, commercial, and laboratory applications. Models range from as low as 5 fpm to as high as 200 mph.

L-4-5—A new 16-page catalog containing complete specifications and price information on the expanded line of Dearbornaire precision air gaging instruments, elements, and related accessory equipment has been published. Featured are single and multiple column air gaging instruments equipped with a "Multi-Amp" tube which permits conversion from one amplification to another simply by changing calibrated scales.

* * *

L-4-6—A new automatic checkout equipments brochure describes four Equipments—an RMS to DC Converter, a Voltage-to-Digital Converter, a Timer-Counter and a Digital Printer. These completely militarized units, designed to meet the rigid environmental requirements of MIL-E 4158 B, have many applications in checkout systems that measures DC voltages, AC voltages, and the transient responses of servos which control time, frequency, ratio, thrust, roll, pitch and yaw.

* * *

L-4-7—The J. C. Busch Co., announces the issuance of their new catalog 124, containing full description and specifications of all types of surface plates, angle plates, box parallels, squares, and straight edges.

List of Short Courses in Quality Control

Usual Time Course is Held	*Type of Course*	*Where Held*	*Course Director*
February	Basic	University of Illinois, Urbana, Ill.	J. A. Henry
February	Basic	Michigan State, Lansing, Mich.	W. D. Baten
May 2-13	Basic (Textile)	North Carolina State College, Raleigh, N. C.	D. B. Stansel
June	Basic	Marquette University, Milwaukee, Wis.	Gayle W. McElrath
June 7-17	Advanced	Purdue University, Lafayette, Ind.	I. W. Burr
June 13-22	Basic (Chem. Ind.)	Rochester Institute of Technology, Rochester, N. Y.	R. D. Pease
June 23-30	Advanced (Chem. Ind.)	Rochester Institute of Technology, Rochester, N. Y.	R. D. Pease
July	Op. Research	University of Michigan, Ann Arbor, Mich.	Oscar Wesler
July	Basic	TAPPI Statistics Conference	M. S. Renner
July	Advanced	TAPPI Statistics Conference	M. S. Renner
July	Advanced	University of Oklahoma, Norman, Okla.	R. L. Huntington
August	Basic (Research)	North Carolina State College, Raleigh, N. C.	.....
August	Advanced (Research)	North Carolina State College, Raleigh, N. C.	.....
August	Basic	University of Michigan, Ann Arbor, Mich.	C. C. Craig
August	Basic	U.C.L.A., Los Angeles, Calif.	Edward Coleman
August	Advanced	U.C.L.A., Los Angeles, Calif.	Edward Coleman
Aug.-Sept.	Basic	University of Connecticut, Storrs, Conn.	R. M. Story
September	Basic	Washington University, St. Louis, Mo.	D. J. Kaufman
September	Advanced	Rutgers University, New Brunswick, N. J.	M. E. Wescott, E. R. Ott
September	Basic	University of Mississippi, Oxford, Miss.	Gayle W. McElrath
October	Basic	State University of Iowa, Iowa City, Iowa	L. A. Knowler
October	Basic (Graphic Arts)	Rochester Institute of Technology, Rochester, N. Y.	R. D. Pease

"The fabulous '60s, with tremendous technological advances predicted, will require this type of perfectionist precision tool . . . and, son—

Here's why Lufkin's indicator is the most sensitive!"

It is made with the precision of a fine watch, with jeweled bearings for longer life.

Lufkin's V32 Dial Test Indicator has a 180° contact point swivel. The dial has clear, easy-to-read graduations to .0001". . . and a switch lever for full reverse action.

Exclusive ball-bearing mounting reduces friction, assures greater accuracy—an excellent example of how Lufkin leads in precision-tool design.

Mount the V32 on a Lufkin Miti-Mite Holder with its rigid (5/16") center post and you have a vertical testing setup that will stay firmly in place. (There's a permanent magnet in the base with a 50-lb. pull.)

See your industrial distributor. He knows precision tools and can show you how Lufkin leads in design and craftsmanship. His stock is maintained to fit your needs. See him for prompt and reliable service. LUFKIN, Saginaw, Mich.

section briefs

AKRON-CANTON . . . Dorian Shainin recently presented an illustrated talk on the application of reliability principles. The illustrations were used to describe a fictional company that was planning to provide a new development under a contract which specified the reliability requirement. Key points in this development were factors of known failure-rate curves and properly designed experiments to discover factors that would subsequently minimize failure rates.

ALBANY . . . On Jan. 7, Theodore Brown of the Graduate School of Business Administration, Harvard University, presented "Statistical Tools for Market Research." This is the third year Mr. Brown has presented a paper to our section. Reaction to Mr. Brown's presentation by section members was all plus.

ALBUQUERQUE . . . The DoAll Exhibit, co-sponsored by the ASQC, ASTE, ASME, and the American Car and Foundry Management Club and held with the co-operation of the Albuquerque Public Schools, was educational, interesting and well attended.

The January meeting was held in one of the meeting rooms of the University of New Mexico Union. At the business meeting it was decided to double the amount of money awarded to an outstanding student in engineering at the university. The amount of the stipend is now $200.

The speaker for this meeting was Leon Bass, QC manager, General Electric Co., Jet Engine Plant, and ASQC junior past president. His topic, "Statistical Methods for Engineering," dealt with the use and application, with graphic examples, of statistically designed experiments during the development of jet engines. After the question and answer period the membership enjoyed coffee and Danish rolls.

ALLENTOWN-BETHLEHEM . . . At our January meeting John D. Hromi, U. S. Steel Corp., spoke on "The Value of Statistics in Experimental Planning." Some of the pitfalls in experimental planning without the aid of statistics were described in detail by our speaker who also recounted some of the advantages of using statistics when doing such planning.

BALTIMORE . . . More than 40 members and guests heard W. E. Barker, Jet Engine Dept., General Electric Co., Cincinnati, Ohio, speak on "Reliability of Measurement Data," at the January meeting.

The executive committee met Jan. 7, at the Johns Hopkins Faculty Club and discussed reliability seminars, a membership drive and the running of an EVOP (Evolutionary Operations) course in May.

The first reliability seminar met at the Morgan State College on Jan. 26. Gordon A. Barnes, A. J. Duncan and Mrs. Naomi McAfee are the committee members.

E. Glocker, our past chairman (1958-59) suggested a joint meeting with AIChE for April.

BOSTON . . . The section held its first "Past Presidents' Night," when M. W. Rogers spoke to us on "Human Relations Problems in Statistical QC," on Jan. 14. Tokens of appreciation were presented to Warren Purcell, Leonard Seder, Louis Rosenblum, George O. Cutter, Forrest G. Fales, Arthur A. Costello, Warren J. Grosjean, Harold J. Davis, Miss Frances Hermann, Harry Duane and Miss Dorthea Looney.

Our Merrimac Valley sub-section is soon going to be in a position to break with us as a full-fledged section. Secretary Cleon Lawrence presented a paper at the New England Conference in Providence on "Processing Complex Quality Data." Gerry Sandler, assisted by F. E. Satterthwaite, spoke at the Sixth Reliability Symposium (ASQC-IRE) on "Random Balance Designs for Reliability," and Dick Jacobs spoke on "Information Exchange Mechanics."

At their January meeting of the MVS, Stanley Zwerling spoke on "Standards in QC," and, in February, Frederick S. Sherwin, discussed "Necessary Quality Requirements of a Subcontractor."

BATTLE CREEK-KALAMAZOO . . . On Jan. 21, a plant tour of the Michigan Carton Co., Battle Creek, Mich., was quickly arranged by Don Byro when our guest speaker, William Buhl, was unable to attend because of bad weather.

During an executive board meeting, education chairman Ralph Anderson and his staff were congratulated for the fine basic QC course which attracted 45 students.

BIRMINGHAM . . . Ed Phelps, control supervisor, American Cast Iron Pipe Co., will discuss quality control 7 p.m., Apr. 15, following a tour of his company at 4 p.m., and dinner at 6 p.m.

CHARLESTON . . . Congratulations to our own Paul Rhudy for his talk on "Statistical Applications in the Chemical Industry." Paul mixed philosophy, logic and statistics in a manner that resulted in one of the most interesting and enlightening talks ever presented before our group.

At the Kanawha Hotel 8 p.m. Apr. 21, R. S. Bingham, Carborundum Co., Niagara Falls, N. Y., will present "Studies in Ore Car and Abrasive Grain Sampling Variation.

CINCINNATI . . . James R. Gilman, QC manager, Bay State Abrasive Products Co., Westboro, Mass., discussed "Quality Reports to Management," at the January meeting. Many practical examples of obtaining acceptance of quality control were presented. One example suggested four different charting techniques which have been used to present the quality picture to management. The Rev. Bryce W. Nichols, executive director of the Goodwill Industries Rehabilitation Center, gave the coffee talk. Goodwill is able to train many of the handicapped so that they have sufficient skills to go into industry and become self-supporting.

The students from the fall education series on elementary quality control were presented their graduation certificates at the January meeting by Murv Bratt, section education director.

The Ninth Annual All Day January Conference was well received by the attendees and was considered a success. One of the twelve sessions "Quality Control in a Casino Operation," attracted considerable comment.

For Mar. 23; the section has scheduled a plant tour of the Ford Transmission Plant. The tour will start at 7:30 p.m. and will be limited to 40 persons.

CLEVELAND . . . The biggest turnout of this season and for many a season was on hand to hear "Headaches and Heartaches of Quality Control." The panel, headed by Wade R. Weaver, Republic Steel Co., consisted of Herman H. Bogin, Parke Davis and Co., Detroit, Mich.; A. V. Feigenbaum, General Electric Co., New York City; Dale L. Lobsinger, United Air Lines, Denver, Colo., and Edward M. Schrock, American Radiator and Standard Sanitary Corp., N. Y. Never before and probably never again had so much quality control know-how and experience been assembled for a section meeting. Everyone was more than pleased with the discussions.

On Apr. 1, Charles Hicks, Purdue University, will speak on "Statistical Thinking for Quality Engineering."

The spring plant tour will be held Apr. 21, when we will tour the Lewis Research Laboratories of the National Aeronautics and Space Administration. The tour will start at 3 p.m.

COLUMBUS . . . E. H. MacNiece, technical consultant, Johnson & Johnson Co., addressed our meeting Jan. 20,

at the Kimble Glass Co. Mr. MacNiece gave us some insight into writing and utilizing specifications in the control of quality.

Our Management Dinner Meeting will be held at the Southern Hotel, Apr. 20, at 6:30 p.m. The subject—"Ford's QC Center." Their approach is on a much larger scale than we usually see, but the philosophy and techniques will give your management an idea of what is being done in quality control today.

DELAWARE . . . About 20 members and guests recently heard Frederic A. Sorensen speak on "Process Improvement Through Evolutionary Operation." Mr. Sorensen clearly explained the method used to optimize processes without producing a lot of rejected materials or poor yields.

EVANSVILLE-OWENSBORO . . . The January meeting was held in Hillie's Restaurant, Evansville, Ind., Jan. 19. John Waldner, Eli Lily Co., spoke on "Experimental Design in Pharmaceutical Development."

The next meeting will be held in Evansville on Apr. 21. Marvin E. Mundell, Mundell & Associates, Milwaukee, Wis., will discuss "Foreign Quality Control."

GREATER DETROIT . . . An evening with Val Feigenbaum was held Jan. 21 at the Rackham Memorial Bldg. Mr. Feigenbaum spoke on the job of the quality control man, how this job led to the movement for professional development and the progress of the ASQC Committee on Professional Development, which he heads. John Rutherford, section chairman of the committee on professional development, added his comments.

The program committee has worked overtime to present a dinner dance with the most attractive program for the largest number of members. Co-chairmen Mike Ambrozy and Dill Maurer tell us that the entire evening: dinner, drinks, dancing and entertainment, will all be included for the price of $12 a couple. If you haven't already done so, put a big circle around Saturday, Apr. 30, and make your reservations for what promises to be the finest evening of the year.

HAMILTON-MIDDLETOWN . . . Ellis B. Godsey spoke on "Sampling Short Cuts Can Reduce Your Inspection Plans," at the meeting Jan. 13. Mr. Godsey explained that once we have a statistical QC program and have proven its effectiveness to control certain aspects of production, we are interested then in cutting the cost of the program. The 9th Annual January Conference jointly sponsored by the Hamilton-Middletown and Cincinnati sections was held Jan. 30, at the Hotel Sinton, Cincinnati, Ohio. The conference, a huge success, brought together renown speakers on such subjects as EVOP, reliability, response surfaces, and multivariate analysis.

A tour of the Process Food Division, Kroger Co., Cincinnati, Ohio, will take place Apr. 13. In connection with the meeting, dinner will be served. Bob Johnson and Jake Vitello of the Kroger Co., and the Cincinnati section will be the hosts and will discuss the tour and plant operations.

HARRISBURG . . . THE ASQC and the Electroplating Society held a joint meeting Jan. 6, in the Arcadia Cafe, Lancaster.

John H. Shreck, member of the Electroplating Society, and Michael O'Hanlon, senior member, ASQC, were the guest speakers. Mr. Shreck is plating methods engineer and Mr. O'Hanlon is assistant manager, both employed by the Carlisle Plant, AMP, Inc. Mr. Shreck stressed the need of constant analysis of the plating baths and the reasons for faulty plating. Mr. O'Hanlon explained the need and use of control charts and showed the patterns or trends developed through their use.

HARTFORD . . . Dorian Shainin presented the facts on reliability to 100 area men Jan. 14, at the Hotel Bond. An afternoon and evening lecture, rounded out by dinner and gaging exhibitions, gave the fudamental steps in a reliability program.

On Tuesday, April 5, during a special technical session, E. B. Godsey, quality control engineer, Corning

Section Code Number Key

The following list is the key to the Section Code numbers used by the national office. This number appears on your membership card; it must also be written in on your annual ballot that you have just received. Accordingly we are publishing the key here for your reference.

0100 Boston
0101 Buzzards Bay
0102
0103 Hartford
0104 New Hampshire
0105 New Haven
0106 Pittsfield
0107 Rhode Island
0108 So. Connecticut
0109 Western Massachusetts
0110 Worcester

0200 Albany
0201 Buffalo
0202 Corning-Elmira
0203 Mid Hudson
0204 Rochester
0205 Binghamton
0206 Syracuse
0207 Utica

0300 Metropolitan

0400 Hamilton
0401 Montreal
0402 Toronto
0403 Western Ontario
0404 Windsor
0405 St. Catherines

0500 Allentown-Bethlehem
0501 Danville-Sunbury
0502 Erie
0503 Harrisburg
0504 Lansdale
0505 Philadelphia
0506 Pittsburgh
0507 Scranton-Wilkes Barre
0508 Trenton

0600 Baltimore
0601 Piedmont
0602 Delaware
0603 Richmond, Va.
0604 Washington
0605 Cumberland

0700 Cleveland

0800 Cincinnati
0801 Columbus
0802 Dayton
0803 Parkersburg
0804 Toledo
0805 Youngstown
0806 Charleston
0807 Hamilton-Middletown
0808 Lima
0809 Lexington
0810 Akron-Canton

0900 Evansville Owensboro
0901 Grand Rapids
0902 Greater Muskegon
0903 Indianapolis
0904 Muncie
0905 N. E. Indiana
0906 South Bend Mishawaka
0907 Richmond, Ind.
0908 Battle Creek-Kalamazoo

1000 Greater Detroit

1100 Chicago

1200 Central Illinois
1201 Iowa
1202 Milwaukee
1203 Minnesota
1204 Racine
1205 Rockford
1206 Winnebago
1207 Kankakee-Joliet
1208 St. Charles
1209 Southern Illinois
1300 Denver

1301 Kansas City
1302 Omaha-Lincoln
1303 St. Louis
1304 Wichita
1305 Tulsa
1306 Joplin
1307 Oklahoma City

1400 Albuquerque
1401 Baton Rouge-New Orleans
1402 Dallas Ft. Worth
1403 Mexico City
1404 San Antonio
1405 South Texas
1406 Waco

1500 Birmingham
1501 Chattanooga
1502 Georgia
1503 Huntsville
1504 Louisville
1505 Memphis
1506 Tennessee
1507 Pensacola-Mobile
1508 St. Petersburg-Tampa
1509 Orlando-Cape Canaveral
1510 N. E. Tennessee

1601 Los Angeles
1602 Santa Maria-Vandenberg
1603 Orange
1604 San Bernardino
1605 San Diego
1606 Tucson
1609 Phoenix

1700 Japan
1701 Portland
1702 Salt Lake City
1703 San Francisco
1704 Seattle
1705 Sacramento

2500 Chapter #1

Glass Works, will speak on how to "Reduce Your Costs Through Short Cuts in Sampling." Mr. Godsey's subject will be of great interest to chief inspectors, inspectors and all other personnel interested in costs of inspection. Dinner will be served (cafeteria style) at the Royal McBee Dining Room, 150 New Park Ave., 6:30 p. m.

At the regular monthly meeting, to be held Tuesday, Apr. 19, at the Nutmegger House, Newington, J. Stuart Broatch, sales engineer, Pratt & Whitney Co., Inc., will have the "New Concepts in Automatic Gaging," as his topic. This is the meeting you cannot afford to miss. See you there!

INDIANAPOLIS . . . Leon Bass, ASQC junior past president, spoke on "How Statistical QC Aids Management Decisions," at our meeting Jan. 15.

Following the talk by Mr. Bass, a symposium on "Professional Development in Total Quality Control," was led by the program moderator, Henry J. Jacobson.

Panel members were Leon Bass; Marjorie Sutherland, Sutherland-Jacobson & Associates, and W. Gordon Thompson, QC manager, Champion Paper & Fiber Co., Hamilton, Ohio.

JOPLIN . . . The section conducted its regular monthly meeting in Springfield on Tuesday evening, Jan. 19. This was the second such meeting held in Springfield—meetings have normally been held in Joplin, but due to the recent development of interest in Springfield, a meeting was held there in November and future meetings are planned for Springfield.

The meeting was held at the Holiday Inn Restaurant. Following dinner at 7 p.m., J. Y. McClure spoke on "Quality Control as a Tool of Management." He is QC manager, Convair Division, General Dynamics Corp., Fort Worth, Tex.

UNIVERSITY OF IOWA . . . On Jan. 29, J. H. Molnar, QC department, Houdaille Industries, Inc., Detroit, Mich., spoke on "QC in a Manufacturing Process." Mr. Molnar did a fine job on the presentation which was followed by a question and answer period of approximately 30 minutes.

For our two-day meeting Mar. 24-25, we will begin with a tour of the Alcoa plant located at Riverdale, Ia. This should be a very interesting tour, as metal fabrication is a field which involves accurate tolerance control. The following morning we will have our technical session by J. N. Berrettoni, Western Reserve University, Cleveland, on "Variable Sampling Plans.

LOS ANGELES . . . January can certainly go down as meeting month for the Los Angeles section. First we had our regular meeting with Frank Squires speaking on "From Critic to Coordinator." This speech was recorded for a partial release over KPFK, an educational FM radio station in Los Angeles. Next there was a joint meeting with IRE-PGRQC, with a multiple speaker program. Finally, the Electronics Division of the Los Angeles section held one of their bi-monthly programs. Frank Squires will appear again in April, with Ed Coleman and Grant Ireson, for the discussion, "The Engineer as a Manager."

Our section, through the Los Angeles Technical Societies Council, is cooperating with Gideon Radio-Television Productions (Lester P. Gideon of our section is the producer) in a weekly one-hour radio show devoted entirely to engineering and technical subjects. It is believed to be the first of its kind ever presented. The show presents current news, meetings and conferences of the week and commentary on the speakers and subjects, a personality of the week, a professional society of the week (Los Angeles ASQC was presented during March), and a personal interview with some top personality on an education/information subject. The station is KRKD-AM, 1150 KC, Sundays 2-3 p.m.

LEXINGTON, LOUISVILLE . . . On Jan. 21, a combined meeting of the Lexington and Louisville sections was held at the Officers' Open Mess, Lexington Signal Depot. The combined group toured the IBM plant during the afternoon and attended the dinner meeting that

Reliability and QC Symposium

The Sixth National Symposium on Reliability and Quality Control attracted 1150 persons, including 15 from the following countries—Canada, 6; Italy, 2; Germany, 2; Netherlands, 2; Great Britain, 2, and Japan, 1.

The Symposium, sponsored by the ASQC, IRE, AIEE and EIA, was held Jan. 11-13, at the Hotel Statler, Washington, D. C.

Julian Sprague

Julian Sprague, right, president of Sprague Electric Co., is shown as he delivered the keynote address of the Symposium, "Reliability—Responsibility."

Discussion topics included: new mathematical techniques, contractual implications, cost considerations, the effect of advanced design and production techniques on reliability, reliability training and education, new maintainability techniques, military requirements and specifications, reliability prediction, new production techniques, accelerated environmental testing, life tests, and failure modes.

During the Symposium 1350 copies of the proceedings were sold. Extra copies are available, for five dollars each, from IRE Headquarters, 1 East 79th St., New York 21, N.Y.

Forty-four ladies registered for the Ladies Program. The highlight of this program was a visit to the Japanese Embassy.

Among visitors from foreign countries at the Sixth National Symposium on Reliability and Quality Control were, from the left, E. H. Ingamells, England; P. Zilstra, Netherlands; A. Sutherland, England, and H. E. Kaiser, Germany.

The general chairman for the Seventh National Symposium is W. T. Sumerlin, Philco Corp., 4700 Wissahickon Ave., Philadelphia 44, Pa. This Symposium is scheduled for Jan. 9-11, 1961, at the Bellevue-Stratford Hotel, Philadelphia, Pa.

Abstracts of papers to be submitted for the Seventh National Symposium on Reliability and Quality Control, jointly sponsored by IRE, AIEE and ASQC, must be received by May 16, 1960.

Ten copies of the abstract, of not more than 800 words, are required. It should include the title of the paper (not to exceed 50 letters, including spaces), the author's name, position and affiliation. In the case of more than one author, please indicate who will present the paper. Ten copies of a biographical sketch of each author, suitable for publication in the Proceedings, must accompany the abstract.

Authors will be notified of acceptance by June 27, 1960. Final papers will be due Oct. 10, 1960. Submit abstracts and biographical sketches to R. E. Kuehn, IBM, Owego, N. Y.

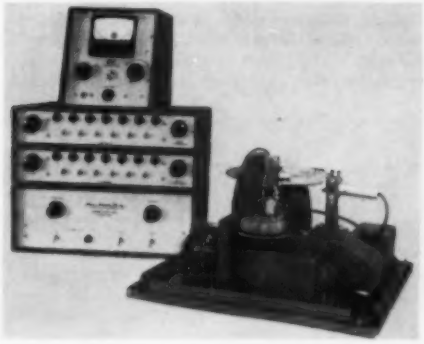
how to MICROtrol* machine tools...

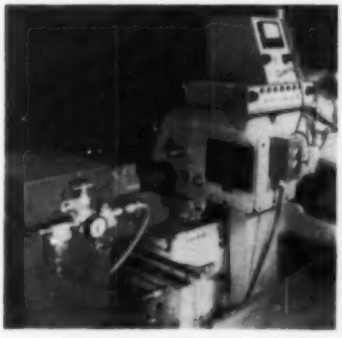
for MICROtolerance Inspection

The *MICRO*trol Standard Comparator Amplifier (16011) shown here is one of four units designed for precise, reliable dimensional inspection in a variety of applications. The building block concept makes all *MICRO*trol units extremely versatile as components of either user–built or AIL custom-built systems.

for Fast Automatic Selection

Operated in combination with selected accessory units the 16011 amplifier is readily adapted to automatic sorting. Here it is shown with the *MICRO*trol 16082 classifier in a high precision production sorting operation.





for Precise Continuous Control

The addition of appropriate logic and decision making *MICRO*trol units provides complete feedback control. A typical system, shown here, combines the accuracy and reliability of *MICRO*trol units with our unique linear actuator . . . . . the INCHWORM*

*Trade Marks

LET US PROVE this outstanding electronic gaging and control equipment in your plant!

Call your Cutler-Hammer sales engineer or write –

AIRBORNE INSTRUMENTS LABORATORY
DEER PARK, LONG ISLAND, NEW YORK
A DIVISION OF CUTLER-HAMMER INC.

CONTROL

night. William B. Whiston, Proctor and Gamble, spoke on "Slick Control Charts Can Cover Sloppy Operations." Dave Birch, ASQC director, gave a brief discussion on the proposed ASQC reorganization plans. A pen set and certificate was awarded to Hogan Trammell, secretary, Lexington Chamber of Commerce, in appreciation for his aid in the establishment of the Lexington section.

The second 12-week term of the Lexington section's elementary statistical methods study course began Jan. 26, with John Sisto, IBM mathematician, as instructor.

METROPOLITAN . . . A very interesting and informative time was had by all at the dinner meeting Jan. 12, in Newark. Our panel moderator, Ellis R. Ott, must be complimented for the fine coverage of "Effective Management of Quality Control."

At our next meeting in New York at 8 p.m., Apr. 21, H. Clayton and D. Smith will discuss "Linear Programming." We will have our pre-meeting clinic at 7 p. m.

MID-HUDSON . . . The section held its first meeting of the 1960 season Jan. 5. Ellis R. Ott, professor, applied and mathematical statistics, Rutgers University, spoke on "Developing an Effective Program of Total Quality Control." His talk included important functions and ingredients of a program of total quality control and considered such problems as design of the product, incoming inspection, routine process controls and the contribution of management.

MILWAUKEE . . . On Jan. 18, the Milwaukee section enjoyed the first of what we hope will be many meetings with George E. P. Box. Mr. Box, head of the new mathematics research center, University of Wisconsin, spoke on "Process Development by Statistical Methods." The audience of 60 heard Mr. Box describe the phases of experimentation necessary in process development, namely—screening, response surfaces and fitting mechanisms. We are also happy to report that Mr. Box has become a senior member in the Milwaukee section, ASQC.

Could an

E-X-P-A-N-D-I-N-G PLUG GAGE

solve a gaging problem for you?

The Comtorplug expansion principle is unique . . . and proven. Hundreds of U. S. precision-production programs use it, including several of the very largest. The unique expansion plug gives true 2-point gaging. You see actual diameter in a fixed reading to fraction of .0001". You measure front or back taper exactly, also ovality, bell mouth, etc. Centering, alignment and pressure are automatic, allowing accurate use by all types of personnel.

For holes ⅛" to 10" dia.

If you produce precision holes in volume

SEND FOR BULLETIN 50

COMTOR COMPANY, 80 Farwell St., Waltham 54, Mass.

COMTORPLUG

Past Chairmen of the Minnesota section are shown as they were being presented ASQC tie clasps in recognition for their work with the section.

Prior to the buffet supper and talk, 30 persons participated in the training sessions on "Lot Plot Method of Acceptance Sampling," and "Analysis of Variance."

MINNESOTA . . . The Jan. 29, meeting was designated Past Chairmen's Night. Eleven past chairmen were presented with ASQC tie clasps in recognition of their efforts in organizing and directing the Minnesota section. The speaker was Stanley C. Amren, who was instrumental in organizing the section and was its first chairman. The following past chairmen received tie clasps:

1947-48-49	Stanley C. Amren, Senior Member
1949-50	Julian N. Berrettoni, Fellow
1950-51	Donald G. Greb, Senior Member
1951-52	Gayle W. McElrath, Fellow
1952-53	Allan L. MacLean, Senior Member
1953-54	Armond L. Stoefen, Senior Member
1954-55	Philip O. Lysne, Senior Member
1955-56	Robert F. Tuve, Senior Member
1956-57	Harold J. Gulde, Senior Member
1957-58	Juel O. Enstad, Senior Member
1958-59	Mermond R. Olsen, Senior Member

MONTREAL . . . On Jan. 20, we had a panel meeting with experts Beckett, de Courval, Sanders and Guthrie expounding their philosophies and techniques. Jacques Richer was MC for the evening. Everyone attending found the evening very interesting.

We are looking forward to the tour of the Canadian Pratt & Whitney Aircraft Co. Ltd. plant at Longueuil, Quebec. G. O. Sanders will MC.

C. T. Shewell, Humble Oil and Refining Co., Baytown, Tex., will speak on the "Box-Wilson Technique," at the meeting Apr. 20, at 7 p.m., at the C. I. L. Bldg. This is a joint meeting with the ASA. This should be a most interesting session.

NORTHEASTERN INDIANA . . . The weather and the flu bug thinned our ranks for the meeting Jan. 21. The members in attendance were very impressed by the talk by Carl D. Larson, QC manager, the General Tire & Rubber Co., Logansport, Ind.

Mr. Larson spoke on "Statistical QC . . . A Practical Sales Talk," and brought out many timely points about the professional status of men in the quality control field.

With 17 years background in QC, Mr. Larson was able to speak with authority, and give comprehensive answers to the many questions of the members.

MUNCIE . . . Two section members, Don Cecil and Francis Jolliffe, were speakers for the January meeting. Their subject, "Setting Up a QC Program at the Borg Warner Plant in England," was presented in a very interesting and informative manner.

NORTHEAST TENNESSEE . . . The January meeting was held in Kingsport, Tenn. The meeting began with panel discussions at the Tennessee Eastman Auditor-

ium. Subjects of the discussions were "Sequential Sampling," and "Statistical Methods for Developing Process Improvement."

Dinner was served at Skoby's Restaurant.

The evening speaker was Albert M. Dexter, director of Metrology, Pratt & Whitney Co., Inc., who gave an interesting talk on the subject "Zero Point One." Mr. Dexter related his experiences during 14 months as guest worker with the National Bureau of Standards, where an attempt was made to measure to the tenth of a millionth of an inch.

OMAHA-LINCOLN . . . The January meeting was held at the Town and Country Cafe in Lincoln. The guest speaker was Robert L. Storer, QC manager, Solid Propulsion Operations, Rocketdyne, McGregor, Tex. Mr. Storer spoke on "Quality Control Planning."

PARKERSBURG . . . During the meeting Jan. 20, at the Chancellor Hotel, Parkersburg, A. T. McPherson, U. S. Bureau of Standards, spoke on "Standards in Quality Control." Slides and articles were exhibited during his talk. Approximately 25 members and friends were in attendance, and enjoyed the evening.

PENSACOLA-MOBILE . . . Two professional societies met for a very pleasant evening of fellowship when the Pensacola-Mobile ASQC section and the Pensacola and Mobile sections of the American Institute of Industrial Engineers held a joint panel discussion on "Operations Research." Experts on the panel included Ronald Groff, computer mathematician, Chemstrand Corp.; Harrell Russell, chief, quality engineering division, Brookley AFB; and E. D. Remy, QC supervisor, Chemstrand Corp. Topics included the definition and origin of operations research, the techniques utilized, and some applications. The panel members, representing a variety of professional backgrounds, exhibited a very comprehensive knowledge of the subject and all in attendance agreed that the discussion was both enjoyable and informative.

The program for April is entitled, "Paperwork Quality Control." The speaker, Fred Seguin, is with the analysis branch of supply quality control, Brookley AFB. Mr. Sequin has been very active in establishing QC procedures in the very complex paperwork processes at Brookley AFB.

PHILADELPHIA . . . A timely and enlightening talk was presented by Maj. Gen. Webster Anderson, Military Clothing and Supply Agency, at the January meeting. He solicited the help of ASQC to find the answers to the many quality problems in the textile industry. One of the major problems is the small percentage of suppliers of soft goods who are able to demonstrate an acceptable quality control system by military standards. The frank message presented by General Anderson should encourage all energetic QC men to pursue the challenging textile field.

Maj. Gen. Webster Anderson

Robert Heiland, Kurt Salmon Associates, Coopersberg, Pa., presented an unusual talk at the technical session following the dinner speaker. His aim was to get the audience to become angry with him. Some of his experiences in quality problems were related with much realism and even though his intent was to irk the members, the stories of off beat quality procedures actually brought forth many laughs. Bob Heiland is a firm believer in using the simple quality approaches first such as the X bar and R charts before going into the more sophisticated procedures.

PORTLAND . . . A dinner and joint meeting with the Purchasing Agents Association was held Jan. 12, at the Multnomah Hotel. This was one of the most successful meetings of the year. A panel type program on "Quality Control as Related to Purchasing," proved to be a very interesting topic, and covered the practical phase of modern-day purchasing. The moderator and panel were men in QC engineering, and they gave their experienced opinions to questions asked from the floor.

SACRAMENTO . . . Walter Hurd, operations manager, Lockheed Missile and Space Division, Sunnyvale, Calif., spoke on the "Polaris Missile Reliability Program," at our meeting Jan. 14, in the Buffalo Room, at the Chuck Wagon. With his extensive experience in the field of reliability, Mr. Hurd is considered to be an authority on reliability operations.

Mr. Hurd discussed the concern of reliability with the quality of design, as specifications must be clearly defined for the contractor to produce the item required.

The speaker's definition of reliability was, "Reliability is to Engineering as Quality Assurance is to Manufacturing."

Mr. Hurd also elaborated on the new Polaris Organization established at Lockheed, of which he is manager. He discussed the organization set-up, the functions of the four sections, and concluded his speech by defining the classification of defects.

ST. CHARLES . . . Wives may have gotten the wrong impression of their husband's activities at our annual ladies' night, Jan. 19, at the Tally-Ho Inn, West Chicago, Ill. Ray Swenson, Illinois Institute of Technology, gave us "A Look at the Probability in Gambling," after an excellent steak dinner. Everyone had an enjoyable evening attempting to predict the behavior of common gaming devices.

Certificates were awarded at this meeting to individuals who recently completed the basic QC course.

ST. LOUIS . . . St. Louis University has submitted six papers by senior students for the Student Award. These will be judged by a committee and awards will be made at the April ASQC meeting. Fifty dollars will be awarded for the outstanding paper in quality control. Work is underway at this university to start a student chapter of ASQC.

The section has voted to give $50 each to the Washington University and the St. Louis University for establishing a scholarship. R. W. Booker and Associates will match the section's contribution.

Plans are underway for the one day conference to be held Apr. 29. Tentatively, part of the program will be geared around the graphic arts. The cooperation of other technical societies is being sought.

SAN ANTONIO . . . James A. Fournier, QC manager, Chassis and Truck Division, Ford Motor Co., presented the "Ford Quality Audit System," at the meeting Jan. 27, at the Hilton Hotel. The paper covered the concept of auditing the final product through the process of determining exactly what the customer would observe when the product is on the show room floor. This type of audit, in conjunction with the in-process audit system, was discussed at length, with the before and after results given.

The section is anxiously awaiting a talk by J. M. Wiesen, Sandia Corp., ASQC District 14 representative, on "Reliability vs. QC," at the meeting Mar. 22.

SAN FRANCISCO . . . The first meeting of the new year was held Jan. 11. Members and guests dined at the Concord Inn, Concord, Calif., and then enjoyed a tour of the Columbia-Geneva Steel Division, U. S. Steel Corp., Pittsburgh, Calif.

During the month of February our section scheduled no meetings to allow for participation in local events of National Engineers' Week.

SOUTH TEXAS . . . At the January meeting, J. A. Fournier, Ford Motor Co., spoke on "The Ford Assembly

Plant Quality Audit Program." A spirited question and answer session followed the interesting and informative presentation.

Ed Layman, Diamond Alkali, conducted a pre-meeting training session on "Sampling Process Industries."

ASQC members in this area watch for a coming announcement of an advanced education program to be sponsored by the South Texas section.

SYRACUSE . . . The following persons have successfully completed Part I of "Advanced Applied Industrial Statistics": David Bauer, Frank Calhoun, Ory Carbonaro, Carlton Kyle, Donald Lawley, Charles Lawson, Steven Piston, Frank Shark, David Stone, and Richard Stone. Part II of this advanced course will be conducted next fall.

TENNESSEE . . . At our second "Something for Everyone" meeting Jan. 17, members and guests heard two excellent talks. Chester Raymo, our ASQC district representative, emphasized several ideas in his talk "Statistical QC Versus Intuitive Inspection." The second talk of the evening was presented by a guest and future ASQC member, Stephan Bleier, Knoxville office, Rohm and Hass. Steve's very interesting topic was "Optical Inspection of the Plexiglass Sheet." During the social period following the presentations, several conversations about the evening's talks were observed.

TOLEDO . . . Nelson G. Meagley, Continental Aviation & Engineering Corp., spoke on reliability at the meeting Jan. 7. The fundamentals, statistics and applications of the subject provided material for an animated discussion period.

A meeting of officers and board members was held to determine the amount of the section's participation in the Engineers' Week Program. The Toledo section will sponsor two high school honor students in scientific and mathematical fields, will nominate a member of the section for the Engineer of the Year award, and join other Engineering societies in the many events of the week.

The meeting Apr. 7, will be held at Lynn's Restaurant, with Russell Brown, director of budget control, Dana Corp., as guest speaker. His subject will be "Budgeting the Cost of Acceptable Quality."

TORONTO . . . There was an exceptionally good attendance for the combined meeting of the American Society of Tool Engineers and the ASQC Toronto section. The meeting was held in the Oak Room, Union Station, Jan. 6. The discussion subject was "The Application of Quality Control in Tool Engineering." Messrs. D. L. Few, A. Sheldon, and R. Comber spoke on behalf of the Tool Engineers, and the case for quality control was presented by Allin P. Deacon: A very educational evening for all.

"Tolerancing," was discussed on the occasion of this section's second evening for study groups. Some 60 persons, including a large contingent from Canadian Westinghouse Co., Ltd., participated in the group discussions. S. Prout, design engineer, Canadian Controllers Ltd., was chairman for the evening.

TUCSON . . . Leon Bass, General Electric Co., ASQC junior past president, spoke on "The Effective Meaning of Blueprint Tolerance," at the January meeting. He stressed the importance of "togetherness" on the part of the designer, the production man, the inspector, and the gage lab people in the interpretation of blueprints. If this is achieved, we will then have everybody shooting for "the middle of the road." He foresees specifications utilizing a nominal and a prescribed distribution.

Among the guests at this meeting was Martin Brumbaugh, who was winter-vacationing in Tucson. We were greatly honored to have this pioneer founding member of ASQC and the first editor of *IQC* take a bow.

Preceding the featured speaker we viewed a movie furnished by the Chrysler Corp., entitled "Chain Reaction." We heartily recommend this movie to other sections.

TULSA . . . A Tulsa section practical training course in statistical quality control was opened Feb. 8, at the Will Rogers High School. The course will usually meet Monday evenings from 7 to 9:30 p. m. and will be conducted by Ralph A. Woods, Jr., through May 20.

On Apr. 25, the course will meet with the regular Tulsa section meeting, featuring "The Cutting Edge," the DoALL Co. Exhibit, at Orville Wright Jr. High School.

UNIVERSITY OF WESTERN ONTARIO . . . . At the Jan. 13, dinner meeting, Ralph Brown, public relations supervisor, Wolverine Tube Division, Calumet and Hecla of Canada Ltd., spoke on "Human Relations in Industry," at Malloy's Restaurant, St. Thomas, Ontario. Mr. Brown observed that "Human Relations is the knowledge of awareness of self and environment." Such understanding of human factors can be of great benefit to supervisors handling industrial personnel problems.

At the Apr. 13 meeting at the Dielcraft Plant in Kitchener, Grant Glennie, Dielcraft Division, Dominion Electrohome Industries, Ltd., will speak at 8 p.m. on "Quality Control at Dielcraft."

UTICA . . . The last meeting Jan. 21, was a huge success despite the weather. A good crowd was present to hear J. L. Coburn, Convair, speak and show slides on the reliability program for the B-58. The discussion stimulated by the talk lasted longer than the talk itself.

WASHINGTON, D. C. . . . "Statistical Techniques for the Quality Control of Food, Beverages, and Allied Products," was the topic of an interesting address at the January meeting by Amihud Kramer, University of Maryland, where workshops first promoted the application of statistical QC in this field in 1951. Mr. Kramer estimates that now almost every food businessman uses QC, though not always synonymous with statistical QC. Among the areas of this industry previously operated by hand but to be mechanized soon, are the sensory areas such as the eye (for appearance), flavor, nutritive value, and the area of tolerances for adulteration. We were surprised to hear that practically no foods are free of some contaminant. Of course, comment on the recent cranberry publicity was inevitable. Bill Weiss, of the Food and Drug Administration, was present to put us at ease once again on that score.

The first term of a training course sponsored by the section with the cooperation of the department of statistics, George Washington University, started Jan. 26, from 7:30 to 9:30 p.m., with A. C. Rosander, Internal Revenue Service, as lecturer. It is intended that this term be the beginning of an advanced course to be given next fall. From one to three sessions are given to a single topic, and the lecturers are all members of the D. C. section. The course was organized by Al McKeon, education committee chairman. Contrary to our previous experience, a substantial number of the enrollment was from a number of different federal agencies that are beginning to take an interest in QC.

On Apr. 5, Mr. Rosander will be guest speaker at the Mid-Hudson section meeting. The occasion will be sponsored jointly by the Poughkeepsie ASQC section and the Society for Advancement of Management. The scheduled topic is "Work Sampling for Cost Analysis and Control." In May, Mr. Rosander is scheduled to speak on "Probability Statistics in Tax Operations," at the ASQC section in Parkersburg, W. Va.

WESTERN MASSACHUSETTS . . . M. J. O'Callaghan, General Electric Co., Bridgeport, Conn., spoke on the "Cost Functions Derived from Regression Analysis," at the meeting Jan. 12. Mr. O'Callaghan presented the methods for establishing cost standards using regression techniques. The plan allows for great flexibility in changing cost standards along with changing conditions.

Management Night is to be held on Apr. 12. A knowledge of what management expects from their QC personnel makes for an interesting discussion, especially when several managers express their views. Three plant managers will speak at this meeting.

WORCESTER . . . The January meeting of the Worcester section was held at Nick's Grill on Jan. 21. An executive committee meeting was held prior to the short

social period that preceded the dinner. After dinner, Ed Harrington, Monsanto Chemical Co., presented a very interesting discussion on "Industrial Applications of Non-Parametric Statistics." Mr. Harrington explained the four different types of data which are normally obtained in industrial experimentation. The major part of the discussion concerned two different parametric values. Mr. Harrington also explained how these same techniques could be used on parametric data with less calculations than the normal statistical techniques used on this type of data.

On Apr. 21, an entertaining program has been arranged for the annual Ladies' Night. Mr. Reed of Southbridge, Mass., will present a program, "Music from the Attic." He will display and discuss many of the old musical instruments which he has collected.

Significant Differences

. . . Akron-Canton—Congratulations to **Bill Hammerly** of Timken who has been promoted to general foreman, control inspection department.

The section is now a member of the Akron Council of Engineering and Scientific Societies (ACESS).

Del Dague and **Bob Archer,** Hoover Co., recently spoke at the Hamilton, Ontario, section All Day Forum.
. . . Albuquerque—**W. E. Boyes,** section chairman, and J. M. Wiesen, ASQC district representative, each presented papers at the recent ASQC, AIEE, IRE, EIA Reliability Symposium held in Washington, D. C.

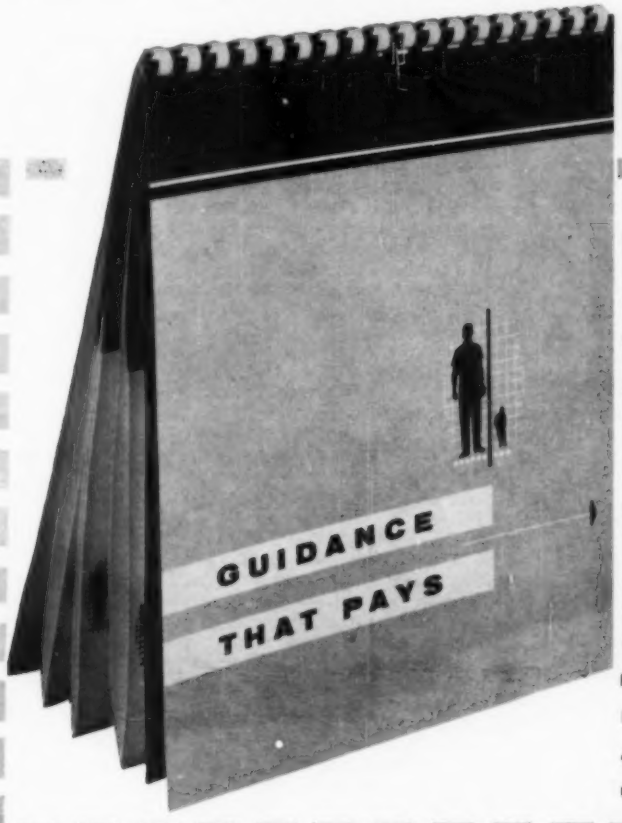
W. M. Sundt, and **R. O. Frantik,** Sandia Corp., recently presented papers at the Sixth Joint Military-Industry Guided Missile Reliability Symposium at Fort Bliss, Tex.
. . . Allentown-Bethlehem—**Dick Zwickl,** our amiable section secretary for the past two terms, has changed his affiliation from the Parish Pressed Steel Division, Dana Corp., Reading, Pa., to the Allentown, Pa., plant of the Western Electric Co.

Sutton Monro, Bell Telephone Laboratories, Allentown, Pa., is instructing a course in industrial engineering at Lehigh University, Bethlehem, Pa.

Membership chairman **Bob Tust** reports that, as a result of a questionnaire sent to all key men in the section, he has learned that there are 24 members eligible to become senior members in addition to the present 13 senior members already in the section. He hopes to change the membership status of most of them before long!
. . . Boston—**George S. Howard** is now QC supervisor, American Enka, W. Acton, Mass.; **Franklin Kramer** to research manager, Walter Baker Co., Dorchester, Mass.; **Edward S. Shaughnessy** to general QC supervisor, Clifford Manufacturing Co., Waltham, Mass.; **"Chuck" Keyes** to supervisor precision inspection, Raytheon Semi-Conductor Division, Newton, Mass.; **Joseph Hansen,** to superintendent of inspection, Laboratory for Electronics, Boston, Mass.; and **George E. Wood,** senior QC engineer, transferred from the Western Massachusetts section to Sylvania, Needham, Mass.

Oliver P. Beckwith, ASQC Fellow, has been appointed to the newly created post of director of quality control for all Ludlow Manufacturing & Sales Co., plants in the Jute Division. His office will be in Needham Heights, Mass.

. . . Charleston—**W. E. Stricklen,** section vice chairman, has been appointed staff engineer to head the plant extension group in charge of construction for the Chesapeake and Potomac Telephone Co. He formerly was supervising accountant in charge of sampling applications and statistical studies in market research and chairman of the business procedures committee for C & P.
. . . Cincinnati—**Murv Bratt** and **Bill Eilrich** were guests at the Workshop of the Mathematics Club of



QUALITY PERFORMANCE

begins with effective
and efficient supervision.

SEE for yourself, how effectively MANAGEMENT INFORMATION expands supervisory thinking. SEND for our free portfolio "Guidance That Pays." It includes:

- Creative Thinking
- Motivation Studies
- 50 Page Planning Guide
- Waste Chart
- Quality and Service

Elliott Service Company, Inc.
Department 4, Mount Vernon, N. Y.

Please provide me with a free copy of "Guidance That Pays."

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

Greater Cincinnati High Schools and discussed "Applications of Probability and Statistics."

Dave Birch has accepted the Chairmanship of the Host Committee for the 1962 ASQC National Convention, which will be held in Cincinnati, Ohio.

C. E. Peters, manager, engine rebuild quality, and **Horace Dimond,** process engineer, both of the production engine department, General Electric Co., are new members of the Cincinnati section.

. . . Cleveland—**Howard O. Schmidt,** Aluminum Company of America, has been appointed chief inspector, Cleveland Permanent Mold plant. Howard is a former Cleveland section chairman.

. . . Dayton—**Louis Polk, Jr.,** has been appointed manager of operations, Sheffield Corp., a subsidiary of Bendix Aviation Corp. The announcement was made by **C. Thorpe Thompson,** vice president and general manager of the Sheffield Corp. Mr. Polk's new assignment is in addition to his continuing responsibilities as assistant vice president and manager of the Instruments and Systems division, and director of Sheffield's domestic and Canadian service plants. Threadwell Tap & Die Co., Greenfield, Mass., a Sheffield subsidiary, now comes under the direction of Mr. Polk.

. . . Hartford—**Kenneth Martin, Jr.,** QC manager, Holo Krome Screw Corp., has taken over section chairmanship for **H. France.** Mr. France has been forced to spend much of his time on company business.

Charles Dennis, QC engineer, Royal McBee Corp., has been appointed vice chairman of the Hartford section.

. . . Indianapolis—**H. M. Handerson,** section chairman and Western Electric Co. executive, has been given an extended job assignment. Good luck, Mel, and hurry back!

. . . University of Iowa—**Edward L. Conard,** The John Deere Co., Moline, Ill., has been appointed for a two year term as a representative to the ASQC Midwest Conference Board.

. . . Lexington—**Bob McCamey,** Proctor and Gamble, is being transferred from Lexington to the Cincinnati office.

Jack Weidlich was recently promoted to a new position of inspection specialist (statistical QC).

Don Freeman is on a two month trip to Europe to assist the Army Signal Depots in establishing QC methods.

. . . Los Angeles—**Frank Squires,** between writing articles for various magazines and speaking at numerous technical and professional societies, has branched out as a management consultant in Los Angeles.

Edward P. Coleman will expand the summer series at UCLA to five courses. Watch for the brochures announcing the program.

Wilson Rogers recently joined the staff of the reliability and quality general office, Hughes Aircraft Co. He was formerly a supervisor in quality and reliability engineering at the El Segundo Division.

Listen to KRKD every Sunday, 2-3 p.m., for the latest in engineering news and information about your Los Angeles section.

. . . Milwaukee—**George E. P. Box,** head of the Mathematics Research Center, University of Wisconsin, Madison, has become a senior member, Milwaukee section, ASQC.

E. G. Harry, formerly QC engineer, Bucyrus-Erie, has been promoted to chief inspector of the company's South Milwaukee works.

Jack E. Davis, formerly with the Evinrude Motors Division, Outboard Marine Corp., Milwaukee, Wis., has been appointed director of technical development for the Crucible Steel Company of America, Pittsburgh, Pa.

. . . Minnesota—**Marvyn Whitefield,** formerly supervisor of finished goods inspection for the Toni Co., has taken a position as QC engineer, Minneapolis Honeywell, Aero Division.

Richard Keefe, section chairman, is now senior QC engineer, Minneapolis Honeywell Ordnance Division. He was formerly reliability engineer in the Semi Conductor Division.

Harold Gulde, past chairman of the Minnesota section, has been elected president of the Twin City chapter of the American Statistical Association for 1960.

L. Keith Coad has joined the technical staff of the Minnesota Mining and Manufacturing Co., as a mathematician and statistical analyst.

. . . Montreal—**Roger Lessard,** education and training program chairman, and his committee are to be congratulated on the addition of a fourth course to the program this year. This is an advanced course in QC by statistical methods. **Claude de Courval,** C. I. L., is the instructor. Mr. Lessard has been elected secretary of the Alumni Association of the University of Montreal.

Arvin Schmidt, Northern Electric Co., has assumed the responsibility of preparing our "Scrap Book of Section Activity," for the year ending July 1, 1960.

Lin Humphries, Aviation Electric Limited, has been appointed chairman of the Fourth Annual All Day Forum to be held in October, 1960.

Vance Ward has been appointed chairman of the newly formed section professionalism committee.

. . . Northeast Tennessee—Thirteen new members were initiated into the Northeast Tennessee section at the January meeting. Eleven of the new members were Raytheon, Bristol, Tenn., employees.

The section program chairman, **James W. Thompson,** has resigned his post as statistical QC supervisor, Raytheon, Bristol, and is now QC manager, International Telephone and Telegraph, Roanoke, Va.

John Daly, section member, has been promoted from QC engineer to statistical QC supervisor at Raytheon, Bristol.

Minter Haynes has been appointed section program chairman to succeed **J. W. Thompson.**

. . . Parkersburg—The section has 36 members as of Feb. 1, 1960.

E. D. Slutz, section secretary, has been transferred to East Sparta, Ohio.

. . . Pensacola-Mobile—**Vernon J. McCluskey,** Brookley AFB, Ala., has been named chairman of the arrangement committee.

. . . Rochester—**William L. Lake** is now QC director for the Apparatus and Optical (A&O) Division, Eastman Kodak Co. He succeeds **Clifford A. Wallace,** who has retired from the company after 41 years of service. Mr. Lake was formerly manager of apparatus service. The announcement was made by **Herman H. Waggershauser,** Kodak vice president and division general manager. **Frank H. Wakeley,** sales administration staff, will succeed Mr. Lake as manager of apparatus service.

. . . St. Louis—**Robert G. McCullough** has been promoted to manager, Electric Products Division, McQuay-Norris Manufacturing Co. He was formerly QC engineer of the parent company.

. . . South Texas—**Joe C. Dickson,** a former chairman of the South Texas section, has announced that he will soon be associated with Bonner and Moore Engineering Associates.

. . . Syracuse—**William Bourne,** former QC manager, RCA, Morristown, N.J., has accepted a new position with the Defense Systems Department, General Electric Co., Syracuse.

Richard G. Brown, Heavy Military Department, General Electric Co., has been promoted from supervisor of process control to supervisor of quality systems.

. . . Toronto—**T. P. Monoghan** has been appointed QC director, Canadian Manufacturing Division, Ford Motor Company of Canada.

The section takes this opportunity to congratulate **J. A. Jennings,** Forum chairman, on his recent appointment as QC manager, Wm. Neilson Ltd. Mr. Jennings was formerly with Canada Wire and Cable Ltd.

. . . Western Massachusetts—To acquaint new members with section officers and committeemen, we have established the practice of two persons in these positions describing their company affiliations, duties, and the QC organization of their plant, at each meeting.

BOOK REVIEWS

W. D. Baten, Editor

26 University Drive, East Lansing, Mich.

EL CONTROL DE CALIDAD EN TISAJE (In Spanish) "Weaving Quality Control." Tarrasa, Apain: Escuela Tacnica Superior de Ingenieros Industriales (Seccion Textil), 1959, 116 pages. Reviewed by H. A. Mereness, Institute of Textile Technology, Charlottesville, Va.

This small book treats of quality control from spinning through weaving. The important specific subjects covered are control charts, sampling plans, spinning control, control of defects, and control of the fabric in the greige.

TOOL ENGINEERING, by S. E. Rusinoff. Published by the American Technical Society, Chicago, Ill., 1959, 326 pages. Reviewed by Wayland P. Smith, assistant professor of mechanical engineering, Michigan State University.

This book is intended as an introduction to the problems and practice of tool engineering. It includes a discussion of planning manufacturing processes and the design of tools, jigs, and fixtures for production operations. The economic aspects of decisions that must be made between many available alternatives is stressed throughout this text. Numerous examples and current illustrations are used to supplement the primarily descriptive material in the book.

Since the tool engineering function varies considerably among manufacturers, the author briefly treats the most obvious areas of overlap such as product design, quality control, industrial engineering and production control, from the tool engineer's viewpoint. Most specialists will feel that their specialty has been inadequately treated.

At its best when purely descriptive, the book is least effective when it attempts to treat the subject quantitatively. In particular, the sections treating production economics contain too many typographical errors in the equations. The equations are seldom fully derived in the text, nor are the different assumptions underlying them made clear. No consistent terminology is developed making it difficult for the reader to follow the development of equations.

In both organization and content this book is quite similar to an earlier text (1950) by L. E. Doyle, under the same title. The need is still present for a more advanced book in this area following a unified, quantitative approach.

ASQC Announces

Advancements and New Members

ADVANCEMENTS TO THE GRADE OF SENIOR MEMBER

(as of December 24, 1959)

Blackburn, George K., Jr., Indianapolis, Ind.
Boyes, William E., Cedar Crest, N. M.
Cleaves, A. Burton, Cuyahoga Falls, Ohio
Durocher, Joseph H., Jackson, Mich.
Kubarewicz, John W., Clifton, N. J.
Lasho, Robert F., Omaha, Nebr.
Miller, Norton W., Tallmadge, Ohio
Nanz, Robert A., Orlando, Fla.
Noble, Cecil M., Akron, Ohio
Wilson, Myron F., Cedar Rapids, Iowa

(as of January 24, 1960)

Deubel, Justin A., Hales Corners, Wis.
Giltner, Thomas A., Albuquerque, N. M.
Le Duc, Roger E., Owego, N. Y.
Reed, Stuart M., Columbus, Ind.

ADMISSIONS TO THE GRADE OF MEMBER

(as of December 24, 1959)

Aldrich, Joseph M., San Diego, Calif.
Anderson, Osmund A., Barrington, Ill.
Andrysiak, Roman, Grosse Pte. Pk., Mich.
Avrutik, Robert F., Mount Vernon, N. Y.
Barnard, Louie W., Chicago, Ill.
Bennie, Stuart H., Montreal, Que., Canada
Bichl, Frederick J., Rochester, N. Y.
Bloom, Arvid R., Rockford, Ill.
Boyd, Harry G., Glendale, Calif.
Boyle, Douglas G., Salt Lake City, Utah
Brannigan, Robert M., Milton, Ont., Canada
Bright, Harold F., Vienna, Va.
Burt, Wilfred S. Jr., West Stockbridge, Mass.
Burton, Marvin L., Grand Prairie, Texas
Byrnes, James O., Gardin City, Mich.
Carr, Peter J., Downers Grove, Ill.
Cashriel, Helen A., New York, N. Y.
Chevis, Frederick G., Willowdale, Ont., Canada
Clauss, Raymond E., New Hyde Park, N. Y.
Coles, George D., Wakefield, Mass.
Condike, Richard, Lexington, Mass.
Conrad, Clarence R., Dalton, Mass.
Coult, Cecil K., Battle Creek, Mich.
Coxon, Donald A., Renton, Wash.
Coxon, John W., Columbus, Ind.
Cronin, Joseph H., Binghampton, N. Y.
Cumalla, Thomas, Milton, Ont., Canada
Danner, Stanley L., Randolph, Mass.
Day, Walter D., Philadelphia, Pa.
De Vink, Jan, Galt, Ont., Canada
Dean, Rex C., Brantford, Ont., Canada
de Larranaga, Juan Pedro, Mexico D. F., Mexico
Dembo, Robert P., Brighton, Mass.
Dion, Charles H., Southbridge, Mass.
Duffy, John H., Syracuse, N. Y.
Emond, Fred R., Pismo Beach, Calif.
Figueroa, Fidel, Mexico D. F., Mexico
Fjelsted, Claire W., Columbus, Ohio
Foreman, Henry, Chicago, Ill.
Frazer, Ralph P., Endicott, N. Y.
Gerber, Herman, East Setauket, N. Y.
Gill, Charles L., Rochester, N. Y.
Goodwin, John T., Lexington, Ky.
Gougeon, Leo J., Canandigua, N. Y.
Graham, Peter J., Anaheim, Calif.
Gray, John, Port Credit, Ont., Canada
Hackbarth, Lowell E., Baltimore, Md.
Harbart, Fred R., Cleveland, Ohio
Harper, John S., Laurel, Miss.
Henry, Clarence R., Detroit, Mich.
Herring, Robert L., Baltimore, Md.
Hershelman, James W., Carbondale, Ill.
Hinton, William L., Lombard, Ill.
Horgan, Joseph W., Ferndale, Mich.
Hudimac, Edward M., Latrobe, Pa.
Hughes, John W., Richardson, Texas
James, Clayton P., Ann Arbor, Mich.
Jarger, Jerome V., Clifton, N. J.
Jeffery, Edward H., Beverly Hills, Calif.
Johnson, Stanley H., Rockford, Ill.
Katzberg, Jess, Tenafly, N. J.
Kendra, Edward J., Somerville, N. J.
Kersey, Phillip A., Lakewood, Calif.
Kisil, Peter, Chateauguay, Que., Canada
Koenig, Edward J., Jr., Syracuse, N. Y.
Kubarewicz, John W., Clifton, N. J.
Larsson, Ivar F., Oakland, N. J.
Law, Charles W., Endwell, N. Y.
Leigh, David Q., Syracuse, N. Y.
Linares T., Ernesto, Zacapu, Mich, Mexcio
Livingston, Robert M., Compton, Calif.
Lorano A., Alberto, Mexico D. F., Mexico
Ellven, David H., Findlay, Ohio
Manley, Emmett W., Elkhart, Ind.
Marsh, Robert O., Maquoketa, Iowa
Matthews, Edgar M., Waterburry, Conn.
Mayer, Hugo E., Jr., Elizabeth, N. J.
Mc Kinney, Edward G., Richardson, Texas
Mendenhall, William, III, Lewisburg, Pa.
Miller, Charles M., Pittsburgh, Pa.
Miller, Daniel J., Riverview ,Mich.
Miller, Paul D., Glendale, Calif.
Minshall, David H., Racine, Wisc.
Mitchell, Bernard L., Plano, Ill.
Moffet, Frederic L., Ingomar, Pa.
Moissonnier, Raymond A., Holdan, Mass.
Moore, Abron H., Brooklyn, N. Y.
Moore, James B., Trenton, Mich.
Morris, James M., Salem, Ore.
Morrison, John R., Palmyra, N. Y.
Murray, Arthur W., Ho Ho Kus, N. J.
Onnela, Raymond, Whittier, Calif.
Oris, Richard J., Endicott, N. Y.
Phoebus, William S., Baltimore, Md.
Powell, Philip C., Jamaica Plain, Mass.
Procurot, Stephen J., Wakefield, Mass.
Quinn, William T., Lynn, Mass.
Rabache, Claude M., Tenafly, N. J.
Reilly, Wilmot B., Toronto, Ont., Canada
Ricke, William H., Sr., Jeffersonville, Ind.
Rinne, Tim, Woodstock, Ont., Canada
Rogers, Edward L., Lynn, Mass.
Rothstein, Arnold A., Los Angles, Calif.
Salza, Frank R., Nichols, Conn.
Seanlan, John K., Southfield, Mich.
Schonfeld, Saul N., Huntington Sta., N. Y.
Shafer, John J., Springfield, Ohio
Shea, John R., Anaheim, Calif.
Shenker, James A., Painesville, Ohio
Siegel, Sidney J., Providence, R. I.
Stahurski, Edward J., Columbus, Ohio
Steinhart, Robert F., Springfield, N. J.
Streling, Clifford E., Livonia, Mich.
Stroud, Richard K., Des Moines, Iowa
Szafranski, John G., Hamilton, Ohio
Valfredo, Richard, Detroit, Mich.
Van Duyne, Richard C., Louisville, Ky.
Vincent, Gene A., Fullerton, Calif.
Voss, Jerome H., St. Paul, Minn.
Walker, Rue C., Springfield, Mo.
Wintle, Ivor J., Lenox, Mass.
Wirrer, Frank V., Santa Monica, Calif.
Wojcik, Frank A., Adams, Mass.
Woods, Robert B., Dallas, Texas
Wright, Robert L., Pensacola, Fla.
Wrightsel, Richard H., Granada Hills, Calif.
Wulfert, George W., Belpre, Ohio
Wagner, William Q., Bellerose, N. Y.
Zelonka, Maurice J., Detroit, Mich.

SECTION CALENDAR (MARCH 25 TO APRIL 30)

SECTION	DATE	PLACE	TIME	SUBJECT	SPEAKER
Albany	Apr. 14	Hot Shoppe, Northern Blvd. & Shaker Rd.	6:30 p.m.	The Brewer Sharpens Process and Improves SQC	Robert I. Tenney, Fleischmann Malting Co., Albany, N. Y.
Albuquerque	Apr. 11	University of New Mexico	8:00	Vendor QC Evaluation Program	J. Y. McClure, Convair, Division of General Dynamics Corp., Fort Worth, Tex.
Allentown-Bethlehem	Apr. 13	Hotel Traylor, Allentown, Pa.	8:00	Standards—Good and Bad	A. T. McPherson, National Bureau of Standards, Washington, D. C.
Baltimore	Apr. 19	Baltimore Memorial Stadium	8:15	Contributed papers by section members	To be announced
Birmingham	Apr. 15	American Cast Iron Pipe Co.	4:00	Tour and Quality Control	Ed Phelps, QC supervisor, American Cast Iron Pipe Co., Birmingham, Ala.
Boston	Apr. 14	Boston MIT Faculty Club	6:30	Annual Meeting, Social Evening and Ladies' Night	.....
Buffalo	Mar. 28	Red Coach Inn, Niagara Falls, N. Y.	6:30	QC in the Electronics Industry	A. Putnam, Radio Tubes Division, Sylvania Electronics, Emporium, Pa.
Battle Creek-Kalamazoo	Apr. 21	Sutherland Paper Co., Kalamazoo, Mich.	8:00	You Can Understand Operations Research	Wm. A. Golomski, H. J. Moyer and Co., Chicago, Ill.
Charleston	Apr. 21	Kanawha Hotel	8:00	Studies in Ore Car and Abrasive Grain Sampling Variation	Richard S. Bingham, Carborundum Co., Niagara Falls, N. Y.
Cincinnati	Apr. 20	Engineering Society Building	8:00	Vendor QC Evaluation Program	J. Y. McClure, QC manager, Convair, Division of General Dynamics Corp., Fort Worth, Tex.
Cleveland	Apr. 1	Cleveland Engineering & Scientific Center	7:45	Statistical Thinking for Quality Engineers	Charles R. Hicks, Purdue University, Lafayette, Ind.
	Apr. 21	National Aero & Space Administration, Lewis Research Laboratories	3:00	Spring plant tour	.....
Columbus	Apr. 20	Southern Hotel	6:30	Management dinner meeting	.....
Evansville-Owensboro	Apr. 21	Evansville	6:30	Foreign Quality Control	Marvin E. Mundell, Mundell & Associates, Milwaukee, Wis.
Greater Detroit	Apr. 30	.....	.....	Dinner dance	.....
Hamilton-Middletown	Apr. 13	Process Food Division, Kroger Co.	6:30	Plant tour	Bob Johnson & Jake Vitello, Kroger Co., Cincinnati, Ohio
Harrisburg	Apr. 2	Hotel Yorktowne, York, Pa.	9:30 a.m.	Fifth District All Day Conference	.....
Hartford	Apr. 5	Royal McBee Corp., Dining Room	6:30 p.m.	Reduce Your Costs Through Cuts in Sampling	E. B. Godsey, Corning Glass Works, Corning, N. Y.
	Apr. 19	Nutmegger House	6:30	New Concepts in Automatic Gaging	J. Stuart Broatch, Pratt & Whitney Co., Inc., W. Hartford, Conn.
University of Iowa	Mar. 24-25	Davenport, Ia.	8:00 a.m.	Plant tour—Alcoa—Aluminum Company of America, Riverdale, Ia.	.....
	Mar. 25	Davenport, Ia.	8:00 a.m.	Variable Sampling Plans	J. N. Berrettoni, Western Reserve University, Cleveland, Ohio
	Apr. 29	Moline, Ill.	8:00 p.m.	Short Run Quality Control	Leon Bass, General Electric Co., Cincinnati, Ohio
Joplin	Mar. 17	Twin Hills Country Club, Joplin, Mo.	7:00 p.m.	How You Can Make a Multi-Plant QC Program Work	H. E. Hehner, Monsanto Chemical Co., St. Louis, Mo., and Walter E. Hubsmith, Lily Tulip Cup Corp., Springfield, Mo.
Lexington	Apr. 21	Officers' Open Mess, Lexington Signal Depot	7:00 p.m.	Industrial Applications of Nuclear Power	J. Gray Stuart, General Electric Co.
Los Angeles	Apr. 19	Carolina Pines Restaurant	6:00	The Engineer as a Manager	Grant Ireson, E. P. Coleman, Frank H. Squires
Louisville	Apr. 11	Jimmy Lynn's Restaurant	6:30	The Challenge of Reliability	W. A. MacCrehan, Bendix Radio, Towson, Md.
Metropolitan	Apr. 21	New York City	8:00	Linear Programming	H. Clayton, D. Smith
Mid Hudson	Apr. 5	Nelson House, Poughkeepsie, N. Y.	7:00	Work Sampling for Cost Analysis & Control	A. C. Rosander, Internal Revenue Service, Washington, D. C.
Milwaukee	Apr. 18	Stratford Hotel	6:00	What Does QC Mean to Management	A. P. Bowman, R. L. Wolff, E. J. Von Rohr
Minnesota	Apr. 26	Mutual Service of Minnesota	7:30	Presentation of Data	H. J. Gulde, Minneapolis-Honeywell, Minneapolis, Minn.
Montreal	Mar. 30	Canadian Pratt & Whitney, Longueuil	7:45	Plant tour	G. O. Sanders, Canadian Pratt & Whitney Aircraft Co. Ltd., Longueuil, Quebec
	Apr. 30	CIL Building	7:00	Box-Wilson Techniques (joint meeting with ASA)	C. T. Shewell, Humble Oil & Refining Co., Baytown, Tex.
Muncie	Apr. 21	Student Center, Ball State Teachers College	6:30	What Management Expects of Quality Control	Edward Spence, Owens-Illinois Glass Co.
Northeast Tennessee	Apr. 12	Tennessee Eastman Auditorium, Kingsport, Tenn.	8:00	Variable Sampling Without Calculations	J. A. Davis, Receiving Tube Division, General Electric Co., Owensboro, Ky.
Omaha-Lincoln	Apr. 19	Lincoln	7:00	.....	G. M. Putthoff, Bendix Aviation Corp.
Parkersburg	Apr. 18	Chancellor Hotel	7:30	Statistical Thinking for Quality Engineers	Charles R. Hicks, Purdue University, Lafayette, Ind.
Pensacola-Mobile	Apr. 19	Martines, Pensacola, Fla.	6:30	Paperwork Quality Control	Fred J. Seguin, Brookley AFB, Ala.
Philadelphia	Apr. 21	Smith, Kline & French Labs.	1:30	Plant tour	.....
		McCallisters Restaurant	6:15	Dinner	.....

St. Charles	Apr. 19	Caterpillar Tractor Co., Aurora, Ill.	3:30	Plant tour	William Dunn, Admiral Corp., and Les Walters.
St. Louis	Apr. 22	Golden Fried Chicken Loaf Restaurant	7:30 6:00	A Design for Quality Applications of Statistics to Analytical Chemistry	Burgess-Norton Mfg. Co. C. T. Shewell, Humble Oil & Refining Co., Baytown, Tex.
San Francisco	Apr. 4	Sangamo Electric Co., Marion, Ill.	7:00	Illinois Sub-Section (plant tour)	Henry Bull, International Staple & Machine Co.
Syracuse	Apr. 11 Apr. 25	Old Plantation, Los Altos, Calif. Turn Hall	7:00 7:00	Reliability & QC, What is the Difference? The Control Chart Method of Doing Analysis of Variance	Paine Discussion Group Miss Bonnie Small, Western Electric Co., Allentown, Pa.
Tennessee	Apr. 14	.....	7:30	Errors of the Third Kind	Allen Kowall, Union Carbide Nuclear Co.
Toledo	Apr. 7	Lynn's Restaurant	6:30	QC in an Inspection Department	E. W. Bailey, Union Carbide Nuclear Co.
Toronto	Apr. 6	To be announced		Budgeting of Cost of Acceptable Quality	Russell Brown, Dana Corp.
	Apr. 20	Continental Can Co., New Toronto	8:00	Annual meeting, buffet supper & social	.....
Univ. of Western Ontario	Apr. 13	Dielcraft Plant, Kitchener, Ont. Canada	8:00	Plant tour, Quality Control at Dielcraft	Grant Glennie, Dielcraft Division, Dominion Electrohome Ind. Ltd., Kitchener, Ont., Can.
Utica	Apr. 19	Hotel Hamilton	5:30	Developing Industry Standards by Statistical Methods	D. H. W. Allan, American Steel and Iron Institute, N. Y.
Western Massachusetts	Apr. 12	Shelton Hotel, Springfield, Mass.	6:30	What Management Expects of QC	Managers of Stanley Home Products, Monsanto and Strathmore Paper
Worcester	Apr. 21	Hickory House	7:00	Ladies' Night, Music from the Attic	Mr. Reed, Southbridge, Mass.

ADMISSIONS TO THE GRADE OF MEMBER

(as of January 24, 1960)

ANDERSON, OLA R., Lee, Mass.
BAISH, CHARLES J. JR., Fairfield, Conn.
BASEGGIO, GINO, Crystal Lake, Ill.
BARTHOLOMEW, JESS M., Michigan City, Ind.
BAZOVSKY, IGOR, Seattle, Wash.
BENSON, RUSSELL, Falls Church, Va.
BERGES, JOHN A., Brockport, N. Y.
BLOOMQUIST, CHARLES E., Los Angeles, Cal.
BOBBITT, JAMES E., Oakland, Cal.
BOFINGER, HARRY W., Hatboro, Pa.
BRUCK, OTTO E., Ottawa, Ont., Canada.
BUCKINGHAM, WILLIAM T., Galena, Ohio
BUCKNER, ORVAL L., Jefferson City, Tenn.
BUDDINGTON, JOHN F., Dallas, Tex.
BUMPUS, HAROLD T., Woodland Hills, Cal.
BUSH, JACK E., Indianapolis, Ind.
CALDWELL, JOHN R., Cumberland, R. I.
CARPENTER, EDWARD D., Grand Rapids, Mich.
CAVEN, JAMES S., St. Petersburg, Fla.
CAYTON, HAROLD P., Belle Center, Ohio
CHACE, KENNETH V., Marion, Mass.
CLOYD, JAMES I., Bristol, Tenn.
CORCORAN, THOMAS F., Ontario, Cal.
COUNTS, PAULINE V., Bristol, Tenn.
CUTRONE, FRANKLYN L., North Attleboro, Mass.
DAWSON, AARON G. JR., Johnson City, Tenn.
DEUBEL, JUSTIN A., Hales Corners, Wis.
DIAMOND, HORACE E., Springdale, Ohio
DREES, WILLIAM E., Los Angeles, Cal.
ERICKSON, ARNOLD C., St. Paul, Minn.
FANTON, RAYMOND E., Collingswood, N. J.
FARRIS, CHARLES R., Hudson, Ohio
FITZGERALD, RAYMOND D., Lyndhurst, Ohio
FLICK, CLAUDE M., Albuquerque, N. M.
FOX, ELDON D., Pittsfield, Mass.
FREUND, STANLEY E., East Meadow, N. Y.
GAMON, THOMAS H., Chattanooga, Tenn.
GARRISON, KENNETH, E., Los Angeles, Cal.
GETZEN, FORREST W., Houston, Tex.
GILTNER, THOMAS A., Albuquerque, N. M.
GLOVER, ARNOLD W., Bristol, Va.
GRIFFITH, JAMES A., Pittsfield, Mass.
GRIGG, THOMAS H., Georgetown, Ont., Can.
HADDOCK, DAVID A., Pensacola, Fla.
HAFFORD, JOSEPH A., Opelika, Ala.
HALL, HAROLD T. JR., Pittsfield, Mass.
HAMATI, VICTOR G., Los Angeles, Cal.
HANSCHKE, ROBERT C., Pittsfield, Mass.
HENNING, RAYMOND A., Park Ridge, Ill.
HERRMANN, ARTHUR, Pittsfield, Mass.
HOYLE, WENDELL P., Greenville, Miss.
HURTADO, PAUL A., Thornton, Colo.
IOSA, JOHN. A., Wolcott, Conn.
JACKETTI, PASQUALE J., Boyertown, Pa.
JOHNSON, RALPH V., Endicott, N. Y.
JONES, EDWIN F. T., Erie, Pa.
KARNO, EDMOND W., Detroit, Mich.
KESSEN, RICHARD F., Indianapolis, Ind.
KLINE, ROBERT K., Richmond, Va.
KONYAK, JOHN F., Clifton, N. J.
KOTTENSTETTE, ALOYSIUS, Broomfield, Colo.
LAMAY, ROBERT C., So. Hadley Falls, Mass.
LASER, FILBERT R., West Reading, Pa.
LE DUC, ROGER E., Owego, N. Y.
LOCKNER, JACK E., Bluff City, Tenn.
LOHR, RAYMOND J., Erie, Pa.
LUKINA, WALTER J., Glendora, Cal.
MAGISTRALE, VICTOR J., Los Angeles, Cal.
MARSHALL, DONALD J., Avon, Ohio
MAY, JOHN JR., Des Plaines, Ill.
MCCARTHY, RUSSELL C., Rochester, N. M.
MCCLUSKEY, VERNON J., Mobile, Ala.
MCCOMBS, CHARLES J., Fulton, N. Y.
MCDERMOTT, FRANK J., Saugus, Mass.
MCMASTER, CLARANCE L., Schenectady, N. Y.
MCLAUGHLIN, THOMAS S., Camillus, N. Y.
MEIER, FRANCE A., Beaumont, Tex.
MEISNER, ALBERT, Arvada, Colo.
MEISS, THOMAS S., Media, Pa.
MILLER, WILLIAM J., Titusville, Pa.
MORSE, HERBERT F., Cincinnati, Ohio
MOSHER, FRED M., Kitchener, Ont., Canada
MUMFORD, ROY D., Gananoque, Ont., Can.
MYLES, KEVIN T., Attleboro, Mass.
NAGIE, RALPH P., Cleveland, Ohio
ORKIN, FREDRIC I., Baltimore, Md.
PALMER, CHARLES F., Kansas City, Mo.
PAPP, GEORGE Z., Warrensville Hgts, Ohio
PATTERSON, RALPH R., San Diego, Cal.
PAYNTER, DONALD E., Ottawa, Ont., Canada
PFAFFINGER, JOSEPH H., Maquoketa, Iowa
PHILLIPS, DONALD L., Cleveland, Ohio
PICKARD, RONALD C., Monroe, Mich.
PONZANI, ISAAC, Warren, Ohio
PRYOR, RUSSELL C., Burlington, Ont., Canada
RANDALL, H. W. JR., Brookley A. F. Base, Ala.
RANDALL, RICHARD G., Los Alamitos, Cal.
REED, STUART M., Columbus, Ind.
REHO, JOHN JR., Cleveland, Ohio
RICE, JAMES H., Altadena, Cal.
RIGGS, BILLY W., Bristol, Va.
RIPPLE, HAROLD O., Warren, Ohio
ROBBINS, ROSS W. JR., Shrewsbury, Mass.
ROMERO, GABRIEL A., Affton, Mo.
RYBICKI, TED C., Chicago, Ill.
RYCKMAN, WILLIAM D., Stratford, Conn.
SALTER, ABBOTT W., Staatsburg, N. Y.
SAMS, HARRY E., Elizabethton, Tenn.
SAMS, SYLVESTER F., Bristol, Tenn.
SANDERS, LOUISE K., Bristol, Va.
SANTILLI, ALBERT E., Cleveland, Ohio
SEIFER, STANLEY, West Hempstead, N. Y.
SHAW, ALLAN E., Rome, N. Y.
SMITH, JAMES C. JR., New Orleans, La.
STEFFEN, ALBERT H., Chattanooga, Tenn.
STER, AUGUST, Cleveland, Ohio
STOKES, ARTHUR W., Albuquerque, N. M.
STROEBEL, RICHARD H., Saginaw, Mich.
STROPE, CLIFFORD P., Chatsworth, Cal.
TAIT, RICHARD H., Canton, N. C.
TAYLOR, ERWIN L., Bristol, Tenn.
TAYLOR, H. AFTON, Independence, Mo.
TOOMBS, ROSE Z., Blountville, Tenn.
TUCKER, HARLAN W., Levittown, Pa.
TUFTS, SCOTT H., Santa Maria, Cal.
VAUGHN, FREDERICK B., So. Charleston, W.Va.
VIESON, GERALD K., Toledo, Ohio
WALKER, WILLIAM F. JR., Plainfield, N. J.
WHITLEDGE, MARSHALL K., Murray, Utah
WILLIAMS, WILLIAM J., Elizabethton, Tenn.
WOOCK, FRANK O., Detroit, Mich.
YARROW, CHARLES L., London, Ont., Canada
YOUNG, WILLIAM V., Culver City, Cal.
ZIMMER, WILLIAM J., Albuquerque, N. M.

ADMISSIONS TO THE GRADE OF ASSOCIATE MEMBER

(as of December 24, 1959)

ALMSTROM, HOWARD F., Oakdale, Mass.
ANDERSON, ROBERT B., Maywood, Ill.
BACINSKI, JOSEPH A., Detroit, Mich.
BILEK, JOHN, Little Falls, N. Y.
BLANCHARD, EUGENE, Livonia, Mich.
BREMEN, GEORGE, Indianapolis, Ind.
BULL, HENRY S., Thornton, Ill.
CHITTENDEN, WILLIAM H., Wheaton, Ill.
CHRISTENSEN, HOWARD B., Newark, N. J.
CHRYSTOF, JACK W., Chicago, Ill.
DEMEREST, JAMES S. JR., Milford, Conn.
DORN, JOHN K., Elmhurst, Ill.
DRISCOLL, WILLIAM E., Medford, Mass.
ESCHEN, WALTER E., Dubuque, Iowa
FESS, JAMES F., Lima, Ohio
FOX, WILLIAM A., Leesport, Pa.
FRY, HAROLD L., McGuffey, Ohio
HAMILTON, RAMONA, E., Port Huron, Mich.
JOHNSON, DONALD H., Brookfield, Ill.
KIRKESENER, JOSEPH G., Detroit, Mich.

Report of the Nominating Committee

The Nominating Committee has given careful consideration to all persons suggested for the American Society for Quality Control elective positions for the year and recommends the following slate.

For President:
J. Y. McClure
Convair—A Division of General Dynamics Corporation
Fort Worth, Texas

For Vice Presidents:
L. S. Eichelberger
A. O. Smith Corporation
Milwaukee, Wisconsin

A. V. Feigenbaum
General Electric Company
New York, New York

A. B. Mundel
Sonotone Corporation
Elmsford, New York

W. R. Purcell
Raytheon Manufacturing Co.
Newton 58, Massachusetts

For Executive Secretary:
D. S. Chambers
University of Tennessee
Knoxville, Tennessee

For Treasurer:
R. L. Fiaschetti
Ansco-General Aniline Film Corporation
Binghamton, New York

For The Committee:
Leon Bass, Chairman

Each of these persons has been contacted and has agreed to allow his name to be placed in nomination and to serve if elected.

KONOPASKY, ADELARDE S., Detroit, Mich.
KRAUSE, FRANCIS R., Vandenberg AFB, Calif.
KNIGHT, JAMES A., Lancaster, Ohio
LINDQUIST, PAUL E., Worcester, Mass.
LISKA, ARNOLD J., Lincoln, Nebr.
MAHANEY, CONRAD E., Parkersburg, W. Va.
MALINA, BARTON J., Rockford, Ill.
MCVEY, RICHARD G., York, Pa.
MOYER, GEORGE D., Pottstown, Pa.
NEIBWANDER, RALPH F., Ada, Ohio
PERLMAN, EUGENE A., Salt Lake City, Utah
RADTKE, RAY N., Dearborn, Mich.
RAMSDELL, WILLIAM H., Houston, Texas
RICHARDSON, THOMAS J., Westfield, N. J.
ROBINSON, FRANCIS B., Reading, Pa.
SAPUTO, RONALD V., Cicero, Ill.
SCHMIDT, HENRY T., Des Plaines, Ill.
SCHWALM, CARL M., Dallas, Texas
SHIPPEN, JAMES O., Santa Maria, Calif.
SLUTSY, LAWRENCE M., Chicago, Ill.
SMITH, WAYLAND P., East Lansing, Mich.
STANEK, EDWARD J., Chicago, Ill.
SPILLMAN, DONALD O., Lexington, Ky.
STERN, BORIS A., Chicago, Ill.
SWARTLEY, OSWIN H., Birdsboro, Pa.
SWIERCZEK, FRANK, Southgate, Mich.
ULMEN, PATRICK J., Endicott, N. Y.
VAVRUS, FRANK J., Argo, Ill.
WEAVER, CHARLES C., Reading, Pa.
WEICKERT, WALTER R., Kitchener, Ont., Canada
WILKINS, HOWARD, Chicago, Ill.
WILLIAMS, DONALD E., Lima, Ohio
WILSON, WALTER L., Chicago, Ill.

Product Education Service

These advertisers provide educational information on their products, expanding the services of your journal, *Industrial Quality Control*.

Their support is twofold. First they place the latest information on product development at your finger tips. In addition their purchase of advertising space supports your Society and this publication. Continue to advance your Society by using their products and services and encourage others to do so. They all merit your consideration.

When writing or talking to advertisers to inquire about their products, always remember to say you saw their ad in *Industrial Quality Control*.

Advertisers in This Issue:

A-1	**Airborne Instruments Laboratory**	29
A-2	**Comtor**	30
A-3	**Curtiss Wright (Princeton Div.)**	15
A-4	**DoALL Co.**	IBC
A-5	**Elliott Service Co.**	33
A-6	**Jones & Lamson Machine Co.**	4-5
A-7	**Kimberly Clark Corp.**	40
A-8	**Lightning Calculator**	23
A-9	**Lufkin Rule Co.**	25
A-10	**Sheffield Corp.**	IFC
A-11	**United Airlines**	BC
A-12	**Carl Zeiss, Inc.**	1

Advertisers in Previous Issues of Volume XVI

Acme Scientific Co.
American Optical Co.
Bell Telephone Laboratories
B & H Instrument Co.
B. C. Ames
Cadillac Gage Co.
CBS Electronics
Cubic Corp.
Custom Scientific Instruments, Inc.
Dallas Publishing House
Davison Chemical Division, W. R. Grace & Co.
J. W. Dice Co.
Eastman Kodak Co.
General Electric Ordnance Dept.
Illinois Institute of Technology
Interscience Publishers, Inc.
Lockheed Missiles and Space Div.
Minneapolis-Honeywell Regulator Co.
Monode, Inc.
Monroe Calculating Machine Co., Inc.
Non-Linear Systems, Inc.
Process Simulation
Reliability Training Course, IRE-ASQC
Remington Rand Univac
Riehle Testing Machines
Rubber Quality Control Conference
Veeder-Root, Inc.
Stanford University Press
Statistical Engineering Institute
Texas Electronic Products Corp.
Unit Process Assemblies, Inc.

Mail the handy coupon below to obtain further information about any of the items appearing in advertisements or new products and new literature described in the **"What's New"** department, pages 18-24.

INDUSTRIAL QUALITY CONTROL
Room 6197 Plankinton Building
161 West Wisconsin Avenue
Milwaukee 3, Wisconsin

Att.: Product Education Service, 460

Please send me further information as indicated below:
(mark key number of advertisements, new products or literature)

ADVERTISERS	NEW PRODUCTS	NEW LITERATURE
A—	P—	L—
A—	P—	L—
A—	P—	L—
A—	P—	L—

Name _____

Address _____

_____

City _____ Zone No. _____ State _____

Classified Advertising

Positions Wanted: ASQC Members 75¢, non-members $1.50 per line. Minimum space 5 lines, maximum 20 lines (2½ in. high).

Positions Available: $1.50 per line. Minimum 5 lines, maximum 20 lines. Box permissible if desired on maximum size. General advertising rates apply to all display sizes (1/6 page minimum).

38 characters and spaces per line. Replies to box numbers and copy should be addressed to American Society for Quality Control, 161 W. Wisconsin Ave., Milwaukee 3, Wis. Deadline is 22nd of second month preceding publication.

POSITIONS WANTED

QUALITY CONTROL MANAGER—Age 43, twenty years experience in Quality Control in Automotive, Aircraft and Missile manufacture. Have established complete Quality Control program, using statistical methods. Reply to Box 16K1.

POSITIONS AVAILABLE

QUALITY CONTROL ENGINEER—Man to manage plant quality control department. Position will require development of the organization in modern quality control engineering methods and the application of scientific techniques for the appraisal and control of product quality from design characteristics to field experience. Product involves mass production of metal parts. Please send resume including salary required and snapshot if available to Box 16X2.

QUALITY CONTROL ENGINEER—Nat'l. mfgr. located in N.E. Penna. has need for a graduate Engineer with a minimum of 3 to 5 yrs. experience. Experience in the writing of inspection procedures, trouble shooting and knowledge of gage design desirable in mass production jewelry industry. Opportunity to work in all phases of Quality Control and to learn and use modern statistical techniques, including design of experiments and analysis of variance. Excellent opportunity with progressive Company working with Management. Liberal employee benefits. Apply by letter to Box 16X1, stating age, education, experience and salary required. Replies treated in confidence.

Quality Managers
Quality Control Engineers
Reliability Engineers
Professional placement service by specialists in these fields. Many fee-paid positions. Send resume, salary, geographic preference to:
Quality Control Personnel Service
267 Hawthorne St.
Malden, Mass.

clinics, conferences, and courses

APRIL

. . . **2—Fifth District All Day Conference, Hotel Yorktowne, York, Pa., sponsored by the Harrisburg, Pa., section, ASQC.**

. . . **3-15**—Sixth Advanced Statistical QC Institute, contact Theodore A. Toedt, University of Connecticut, Storrs, Conn.

. . . **6-8**—Technical Meeting and Equipment Exposition Institute of Environmental Sciences, Biltmore Hotel, Los Angeles, Calif., Contact H. F. Sander, executive secretary, P. O. Box 191, Mount Prospect, Ill.

. . . **18-19**—Third Annual Conference on Automatic Techniques, sponsored jointly by ASME, IRE, and AIEE, at the Cleveland-Sheraton Hotel, Cleveland, Ohio, contact the Publicity Chairman, Room 530, 1213 W. 3rd St., Cleveland 13, Ohio. Session II, Apr. 18, will cover Automatic Inspection and Quality Assurance.

. . . **20—Sixteenth Annual QC Conference at the University of Rochester, sponsored by the Rochester section, ASQC, contact C. Robert Stumpf, publicity chairman, Eastman Kodak Co., Kodak Park Works, Film Testing Division, Bldg. 6B, Rochester 4, N.Y.**

MAY

. . . **2-13**—Short Course on Statistical Quality Control for the Textile Industry, the School of Textiles, North Carolina State College, Raleigh, N. C., contact D. B. Stansel, P. O. Box 5125, State College Station, Raleigh, N. C.

. . . **6—Quality Control in the Competitive Market All Day Seminar, sponsored by the ASQC Akron-Canton section, contact Walter C. Siff, the General Tire & Rubber Co., 1708 Englewood Ave., Akron 9, Ohio.**

. . . **6-7 — Evolutionary Operations (EVOP) Course, sponsored by the ASQC Baltimore section, at the Lord Baltimore Hotel, contact E. M. Glecker, Research Dept., W. R. Grace & Co., Clarksville, Md.**

. . . **9-13**—1960 Castings Congress and Exposition, Philadelphia, Pa., sponsored by the American Foundrymen's Society, contact Denham & Co., 925 Book Bldg., Detroit 26, Mich.; telephone WO 5-4941.

. . . **16-18**—Symposium on Statistical Methods in the Pulp and Paper Industry sponsored by the Finnish Paper Engineers' Association in Helsinki, contact Nils J. Lindberg, general secretary of the symposium, the Finnish Paper Mills Association, Helsinki, Finland.

. . . **19-21—Course in the Evaluation and interpretation of physical and chemical testing methods, sponsored by the ASQC Chemical Division, Philadelphia, Pa., instructors will be Grant Wernimont, Eastman Kodak Co., and John Mandel, National Bureau of Standards, contact Richard A. Freund, ASQC Chemical Division Education Committee, Eastman Kodak Co., Film Testing Division, Kodak Park, Bldg. 6B, Rochester 4, N.Y.**

. . . **24-26—14th Annual Convention and Exhibition of the American Society for Quality Control, Hotel Sheraton-Palace, San Francisco, Calif.**

. . . **26-28—Third ASQC Workshop-Seminar, Management of Quality Control, Sir Francis Drake Hotel San Francisco, Calif., contact the Third ASQC Workshop-Seminar, ASQC, 161 W. Wisconsin Ave., Milwaukee 3, Wis.**

. . . **30-31, June 1—Mid-Pacific Conference, Honolulu.**

JUNE

. . . **6-10**—Tenth Annual Program of Quality Control for the Graphic Industries, Rochester Institute of Technology, Rochester, N.Y., contact Harold M. Kentner, Extended Services Division, RIT, Rochester 8, N.Y.

. . . **7-17**—Second Annual Short Course on the Design of Experiments, Charles R. Hicks, instructor, and a concurrent Advanced Short Course in Quality Control, Irving W. Burr, instructor, at Purdue University, contact Mr. Hicks or Mr. Burr, Purdue University, Lafayette, Ind.

. . . **13-24**—Two University of Michigan Engineering Summer Conferences: Models and Simulation in Operations Research, and Foundations and Tools for Operations Research and the Management Sciences, contact R. E. Carroll, Engineering Summer Conferences, University of Michigan, College of Engineering, Ann Arbor, Mich., telephone NOrmandy 3-1511, Ext. 2079.

. . . **13-30**—Two sessions of the 17th annual Statistical QC Program for the Chemical Industries, Rochester Institute of Technology, Rochester, N.Y.; 1st session—June 13-20, 2nd session—June 23-30; Applications Seminar—June 21-22, contact Harold M. Kentner, Extended Services Division, RIT, Rochester 8, N. Y.

. . . **14-17**—Annual Cornell University Industrial Engineering Seminars, sponsored by the Department of Industrial and Engineering Administration, Sibley School of Mechanical Engineering, Cornell University, Ithaca, N. Y., participants enroll in industrial management, engineering administration, operations management of the smaller company, work measurement, systems simulation using digital computers, statistical decision-making: theory and applications, or statistical reliability analysis: theory and applications, and also attend general sessions, contact J. W. Gavett, seminar coordinator, Department of Industrial and Engineering Administration, Upson Hall, Cornell University, Ithaca, N.Y.

Change of Mailing Address

Prompt notification of a change of address enables us to correct your records at the Headquarters Office, correct your mailing address for **Industrial Quality Control**, and notify your section to correct their mailing list. If you move, mail this form to ASQC, 161 W. Wisconsin Ave., Milwaukee 3, Wis., 6 weeks before your change of address.

Limitations of automatic, high-speed addressing equipment permit only 3 lines and the indicated number of characters, including spaces, for your address. For typewriter, space between letters.

—Office Use Only—

Do not write in this space

Ser. No. .....

State Code .....

City Code .....

Section Code .....

First Name Middle Initial Last Name

Your New Residence Address

City Zone State

Also to insure complete information in our records, please fill in the following if it has changed.

New ASQC Section

Your New title or position New Employer

Your New Company Address

City Zone State

Products or service of your company or office

4-60

For a Simple Comparison Between Process Capability And Process Achievement

Read

CONTROL CHARTS WITHOUT CALCULATIONS

By PAUL C. CLIFFORD

State Teachers College, Montclair, N. J.

This Reprint from the May, 1959, issue, *Industrial Qual' y Control*, presents a method in which individual measurements are plotted, thus eliminating the data sheet. This procedure gives a simple comparison of process capability and process achievement.

American Society for Quality Control
161 W. Wisconsin Ave.
Milwaukee 3, Wis.

Please send me ..... copies of "Control Charts Without Calculations," at 25 cents each.

Name .....

Address .....

City ..... **State** .....

Discount for bulk orders: 10 percent for 10 or more copies; 25 percent for 50 or more. Orders under $3.00 must be accompanied by remittance.

OPERATIONS RESEARCH SCIENTIST

Education — College graduate. Strong orientation in mathematics. MS or PhD in Engineering, Physics, Chemistry or Mathematics desirable.
Nature of Work — Will be part of a professional group operating within Research and Development Division. Consults on operation research techniques. Member of project teams. Problems involve large areas of activity in such projects as allocation of resources, distribution materials and products, scheduling operations, replacement of equipment using classical operations research methods and developing those needed. IBM 650/610 available.
Salary — Starting salary depends upon individual qualifications. Promotion from within on the basis of merit is an established policy of Corporation. *Write* for detailed specifications and application form to:

PERSONNEL PROCUREMENT

KIMBERLY-CLARK CORPORATION

NEENAH WISCONSIN

CONSULTING SERVICES

Responsibility of the American Society for Quality Control, Inc., for Consulting Services advertising is limited to certification that advertisers hold the grade of membership in the Society stated in their advertisements. Qualification requirements for the several grades of membership are set forth in the Constitution of the Society. Business card ads are available only to members of the Society—12 insertions $75.00; 6 insertions $50.00.

VENDOR SURVEYS-INSPECTION
A National Organization with Engineers in Nine Key Centers Coast to Coast.
Write for Schedule of Fees
R. CALVERT HAWS, Member, ASQC
QUALITY CONTROL ENGINEERS, INC.
6399 Wilshire Blvd., Los Angeles 48, Calif.

R.R. 3, Box 258
Greenwood, Indiana
SUTHERLAND-JACOBSON & ASSOCIATES
Consultants in Quality Control
Inspection Procedures, Process Controls, Statistics for Research and Development
M. L. SUTHERLAND, Ph.D., Fellow ASQC
H. J. JACOBSON, Fellow ASQC

Quality Control Consultant
THOMAS A. BUDNE
Fellow, ASQC
3 Dunster Road **Great Neck, N.Y.**

EDWARD A. REYNOLDS
Fellow, ASQC
LIGONIER, PA.

Consulting Services in Quality Control
Since 1945
RALPH E. WAREHAM
Fellow, ASQC
122 Orchard Ridge Telephone
Chappaqua, New York CEntral 8-3715

BERNARD HECHT
Quality Control & Reliability Specialist
Fellow, ASQC
Planning and Staffing Q. C. Organizations
Training in Statistical Methods
Quality Assurance Programs
5410 Wilshire Blvd. Los Angeles 36, Calif.
WEbster 8-0121

QC Planning Defect Prevention
LEONARD A. SEDER
FELLOW ASQC
267 HAWTHORNE ST.
MALDEN MASS.
DAvenport 4-5446
Organizing for Quality Training

Quality Control Consultant
HARMON S. BAYER
Fellow, ASQC
1154 Book Building Telephone
Detroit 26, Michigan WOodward 5-3796

Management Controls
FOUNDED IN 1945
References and Literature on Request
Senior Partner: 699 Rose Ave.
W. E. JONES DES PLAINES, ILL.
Fellow, ASQC *Vanderbilt 4-1317*

DoALL Announces... great news for setup and inspection departments

DANNY DoALL
This side is finished to a grade of your choice
DANNY DoALL
This side is finished to match the top — or to another grade!

NEW! Double REVERSIBLE Faced BLACK GRANITE SURFACE PLATES

DoALL reversible surface plates are easily turned by standard bolts screwed into threaded inserts permanently imbedded in two sides. Fixture or work that must be held rigid is easily secured to the plate by a "C" clamp at any point along the periphery.

Here's a money-saving, time-saving, space-saving "first"—black granite surface plates finished on both faces. They're easily reversed by using inexpensive removable trunnions.

There's double usefulness in these new DoALL reversible surface plates. For example, one side can be used as a working surface while the reverse side is reserved for master inspection. Both sides can be lapped to the same grade or to any combination of standard grades—AA (laboratory), A (inspection) or B (shop). And you always have an extra plate that takes no extra space in reserve for emergencies.

DoALL reversible surface plates cost only one-third more than single-faced plates. This slight extra cost is more than offset by savings in freight charges, down time and the expense of having a plate reconditioned.

DoALL reversible plates are made from the same high-quality granite used for all other DoALL black granite products. They are extremely rigid, glare-free and harder than tool steel. There's no better granite for this purpose—anywhere.

Call your local DoALL Sales Engineer. He will gladly advise you on your black granite surface plates and accessory requirements.

See the DoALL Exhibit in Booth 1226, ASTE Tool Show

BG-5

Find Your DoALL STORE In The "Yellow Pages"

This is a typical DoALL Store

The DoALL Company, Des Plaines, Illinois

Call Your DoALL Sales-Service Store

FLY THERE ON UNITED AIR LINES!

14th Annual ASQC Convention and Exhibition

San Francisco, California, May 24, 25 and 26, 1960

You enjoy delicious meals in the extra privacy of wide, high-backed seats.

United Air Lines serves the Convention Route of the Nation—with convenient day and night Mainliner® schedules between 80 major cities coast to coast, and to Hawaii. Service includes new DC-8 Jet Mainliner — the *best of the jets*. And, of course, United Air Lines famous *extra care* service attends you all the way. So make sure you don't miss out on this year's convention—fly there on United Air Lines Mainliners. For reservations, call your local United Air Lines office.

THE BEST OF THE JETS...

PLUS UNITED'S EXTRA CARE

UNITED AIR LINES DC-8®

JET MAINLINER, BY DOUGLAS